MITSUBISHI

HF-1400

HF-2400

HF-3400

FHF-1500

FHF-2500

FHF-3500

13V & 14V HIGH RESOLUTION COLOUR DISPLAY MONITORS

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SECTION 1
SPECIFICATIONS

The HF-series color monitor are designed to be an economical high performance RGB analogue input color monitor with in-line gun and provides following features.

1.1 Features

(A) High Resolution

Clear and sharp pictures obtain from 0.31 mm dot pitch and short pulse rise and fall time (12 sec) of Video amplifier.

(B) Compact Style

A very compact cabinet like a B/W monitor can be designed.

(C) Stable Convergence

Self-convergence assemblies mounted on CRT provide stable convergence.

(D) Wide Range Adaptability

Wide range of sweep frequency as follows and line input voltage (100-120/200-240 V) adjustable without using soldering iron.
HF3400/FHF3500-- 30 ∿ 35kHz, HF2400/FHF2500 -- 20 ∿ 25kHz, HF1400/FHF1500-- 15.5 ∿ 20kHz

(F) Low Power Consumption and Simple·Configuration, High reliability and easy maintenance are assured.

1.2 Specifications

1. AC Input Voltage

   AC 90 ∿ 132V or 180 ∿ 265V (Tap selectable) 60/60 Hz

2. Power Consumption

HF3400 --- 67W (100 VA)	FHF3500 --- 70W (100 VA)
HF2400 --- 63W (90 VA)	FHF2500 --- 66W (95 VA)
HF1400 --- 60W (85 VA)	FHF1500 --- 63W (90 VA)

3. Input signal

   (a) Connector BNC connectors for all inputs

   (b) Connection See Fig. 4-1

   (c) Sort of Input

   (1) Video signal --- Red, Green, Blue

   (2) Sync. signal --- 2 channels

   Sync. signal for composite video shall be composed in Green channel.

   Composite sync. signal and separate sync. signals shall be connected to SYNC. channel.

   (d) Termination 75Ω or High Impedance are selected by terminal switch

   (e) Polarity of input signal

   Video signal --- Active High

   Sync. signal --- Active Low

   (f) Input levels

   (1) Composite video --- 1.0 Vp-p,

   Red and Blue : 0.7 Vp-p

   Green : Video --- 0.7 Vp-p,

   Synch --- 0.3 Vp-p

   (2) Composite sync. --- 1.5 ∿ 5 Vp-p

   (3) Video --- 0.7 Vp-p

   (4) Separate Sync. (HD, VD) --- 1.5 ∿ 5 Vp-p

   (g) Timing Requirements See Fig. 1-1

4. Scanning Frequency

(a) Vertical frequency ; 40 ∿ 70 Hz

(b) Horizontal frequency ; Tap selectable as follows

HF3400/FHF3500 -- 30 ∿ 33kHz "Low" tap ; 33 ∿ 35kHz "Hi" tap

HF2400/FHF2500 -- 20 ∿ 23kHz "Low" tap ; 23 ∿ 25kHz "Hi" tap

HF1400/FHF1500 -- 15.5∿17.5kHz "Low" tap ; 17.5∿20kHz "Hi" tap

(c) Blanking time Vert. -- 0.8mμsec. : Hor. -- as follows

HF3400/FHF3500 -- 6.5μsec., HF2400/FHF2500 -- 8.0μsec.,

HF1400/FHF1500 -- 10.0 sec.

5. CRT

HF3400/2400/1400 --- 14" (13" V) self-convergence type

FHF3500/2500/1500 -- 15" (14" V) self convergence type

6. Max. Effective Screen Size

HF3400/2400/1400 --- 240(W)×180(H) mm ;

FHF3500/2500/1500 --- 255(W)×190(H) mm with attached timing chart

7. Ambient Temperature

0∿+40°C with Mitsubishi Standard Cabinet

8. Warm-up Time

20 minute max. to meet the specification

9. Convergence

Less than 0.4mm in a certainly located area bounded by a circle of 180 mm diameter. Elsewhere Deviation is less than 0.6 mm.

10. Raster size Regulation

Less than 3 mm (CRT beam current 0 ∿ 200μA)

11. Linearity

Less than 5% (MAX-MIN) ×100/(2X MEAN)

12. Geometry

Less than 2% of raster height

13. Control Panel

Power SW and contrast control are provided

14. Output for LED

(a) Output current about 20mA (6V through 220Ω)

(b) Connector (J907) "NH" connector (2 Pin) of JST

(c) Connection No. 1 for Anode : No. 2 for Cathode

15. Configuration

HF-3400/2400/1400 --- See Fig. 3-2

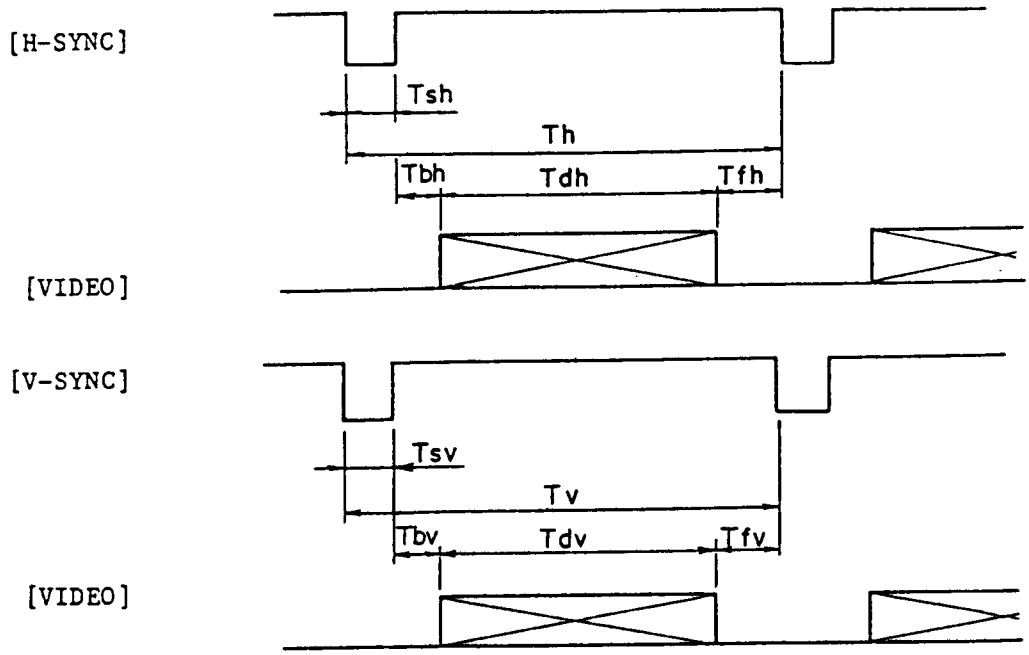
FHF-3500/2500/1500 --- See Fig. 3-3

16. Weight

HF-3400/2400/1400 --- 12 kg

FHF-3500/2500/1500 --- 14 kg

Fig. 1-1 Standard Timing Chart of HF-Series



		Timing of Ex-factory
HF3400/FHF3500		
H-Period	(Th)---28.5<Th<33.3 μS	31.7μ SEC
H-Sync	(Tsh)--Th x 0.08 μS	2.5μ SEC
H-Front Porch	(Tfh)--(Th-Tdh-Tsh)/4 μS	1.1μ SEC
H-Back Porch	(Tbh)--Cfh:Tbh=1:3	3.5μ SEC
H-Display Period	(Tdh)--(Th-6.5)<Tdh<(Th-8.5) μS	24.6μ SEC
V-Period	(Tv)---14.3<Tv<25 mS	16.67 m SEC (525H)
V-Sync	(Tsv)--3H (1H=1Th)	0.095 m SEC (3H)
V-Front Porch	(Tfv)--(Tv-Tdv-0.7)/2 mS	0.032 m SEC (1H)
V-Back Porch	(Tbv)--Tfv+(0.7-Csv) mS	0.693 m SEC (22H)
V-Display Period	(Tdv)--Tdv<(Tv-0.8) mS	15.85 m SEC (499H)
HF2400/FHF2500		
H-Period	(Th)---40.0<Th<50.0 μS	41.7μ SEC
H-Sync	(Tsh)--Th x 0.08 μS	3.3μ SEC
H-Front Porch	(Tfh)--(Th-Tdh-Tsh)/4 μS	1.3μ SEC
H-Back Porch	(Tbh)--Tfh:TbH=1.3	3.9μ SEC
H-Display Period	(Tdh)--(Th-8.5)<Tdh<(Th-10.5) μS	33.2μ BEC
V-Period	(Tv)---14.3Tv<25< mS	16.67 m SEC (400H)
V-Sync	(Tsv)--3H (1H=1Th)	0.12 m SEC (3H)
V-Front Porch	(Tfv)--(Tv-Tdv-0.7)/2 mS	0.04 m SEC (1H)
V-Back Porch	(Tbv)--Tfv+(0.7-Tsv) mS	0.66 m SEC (16H)
V-Display Period	(Tdv)--Tdv<(Tv-0.8) mS	15.85 m SEC (380H)
HF1400/FHF1500		
H-Period	(Th)---50.0<Th<64.5 μS	63.5μ SEC
H-Sync	(Tsh)--Th x 0.08	5.0μ SEC
H-Front Porch	(Tfh)--(Th-Tdh-Tsh)/4 μS	1.3μ SEC
H-Back Porch	(Tbh)--Tfh:Tbh=1:3	3.8μ SEC
H-Display Period	(Tdh)--(Th-10.0)<Tdh<(Th-12.0) μS	53.4μ SEC
V-Period	(Tv)---14.3<Tv<25 mS	16.67 h SEC (262H)
V-Sync	(Tsv)--3H (1H=1Th)	0.19 m SEC (3H)
V-Front Porch	(Tfv)--(Tdv-Tdv-0.7)/2 mS	0.06 m SEC (1H)
V-Back Porch	(Tbv)--Tfv+(0.7-Tsv) mS	0.57 m SEC (9H)
V-Display Period	(Tdv)--Tdv<(Tv-0.8) mS	15.85 m SEC (249H)

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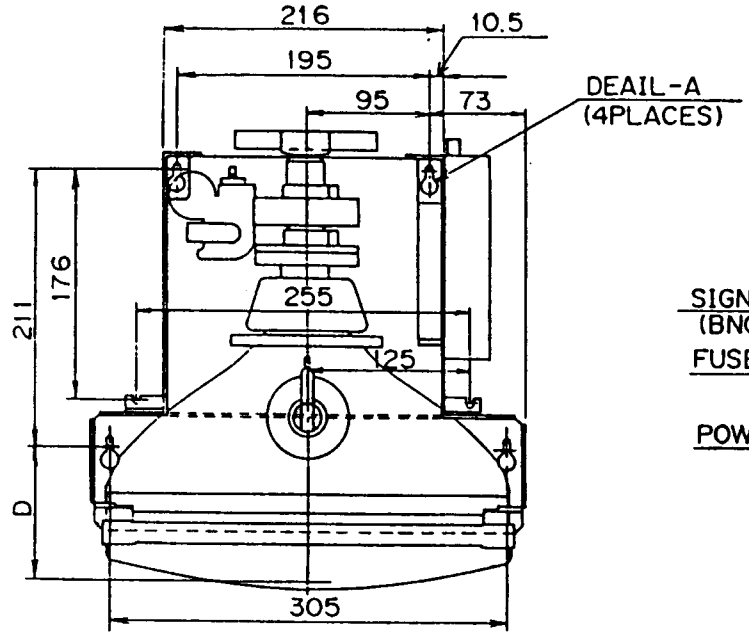
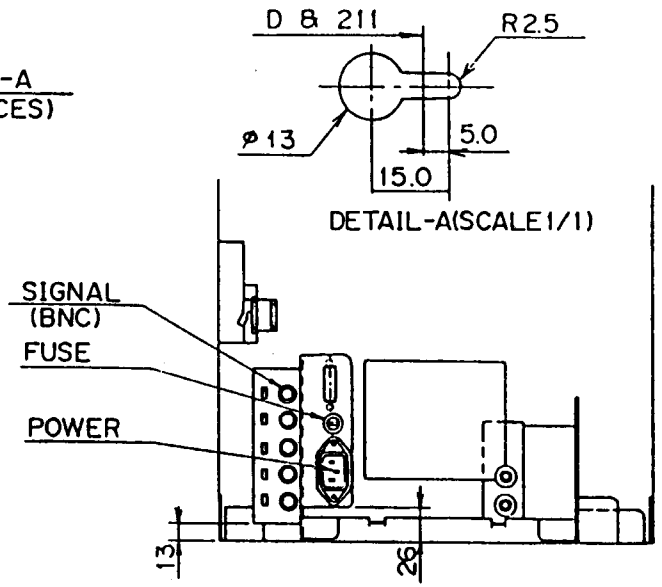
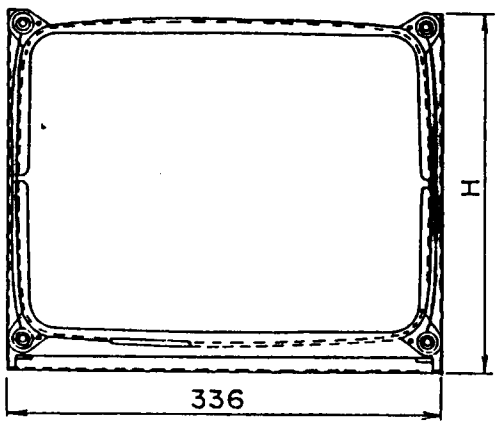
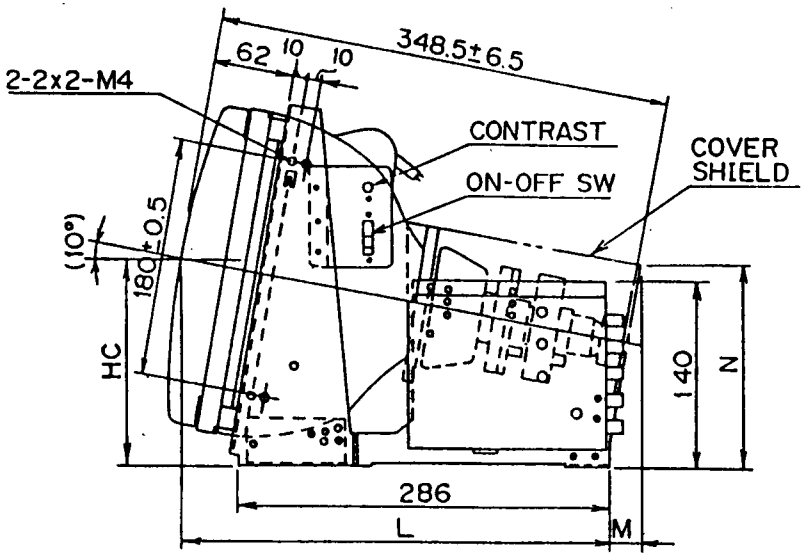




CRT TILT	H(±3)	HC(°3)	D(TPY)	L(°5)	M	N
0°	274	142	128.5	352.5	4)	4)
2.5°	274.4	145.2	122.9	346.9	4)	4)
5°	274.3	148.2	117.2	341.2	4)	4)
7.5°	273.8	151	111.4	335.4	36	155
10°	272.7	153.5	105.5	329.5	36	155

1) DIMENSIONAL TOLERANCE UNLESS OTHERWISE SPECIFIED ±3.
2) DIMENSION NOT INCLUDING SCREW.
3) STANDARD COVER SHIELD CAN BE APPLIED TO CHASSIS WITH CRT TILT 7.5 & 10°.
4) OPTIONAL COVER SHIELD WILL BE APPLIED TO CHASSIS WITH CRT TILT 0°, 2.5°& 5°.





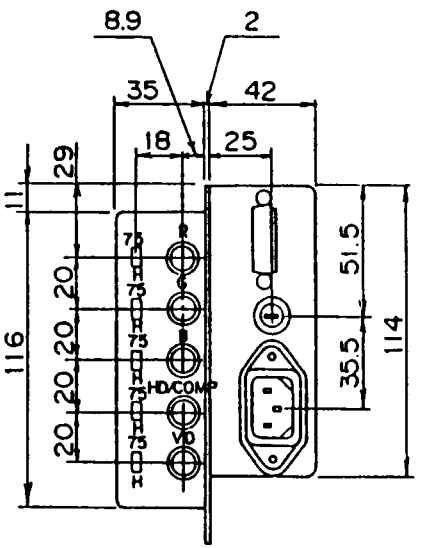
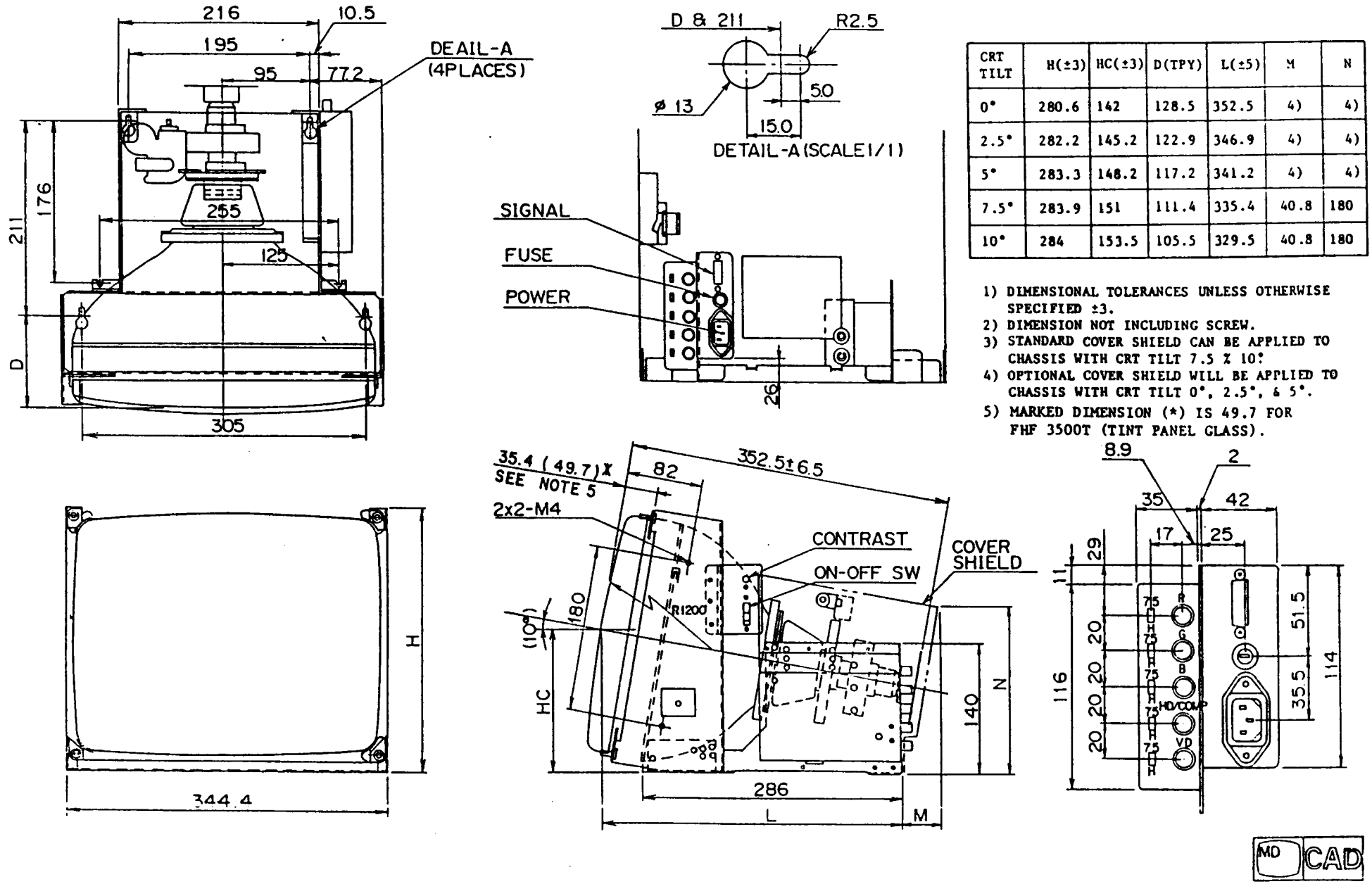


Fig. 1-2 Outline of Chassis (HF3400/2400/1400)



CRT TILT	H(±3)	HC(±3)	D(TPY)	L(±5)	M	N
0°	280.6	142	128.5	352.5	4)	4)
2.5°	282.2	145.2	122.9	346.9	4)	4)
5°	283.3	148.2	117.2	341.2	4)	4)
7.5°	283.9	151	111.4	335.4	40.8	180
10°	284	153.5	105.5	329.5	40.8	180

1) DIMENSIONAL TOLERANCES UNLESS OTHERWISE SPECIFIED ±3.
2) DIMENSION NOT INCLUDING SCREW.
3) STANDARD COVER SHIELD CAN BE APPLIED TO CHASSIS WITH CRT TILT 7.5 % 10°
4) OPTIONAL COVER SHIELD WILL BE APPLIED TO CHASSIS WITH CRT TILT 0°, 2.5°, & 5°.
5) MARKED DIMENSION (*) IS 49.7 FOR FHF 3500T (TINT PANEL GLASS).

MD CAD

Fig. 1-3 Outline of Chassis (FHF3500/2500/1500)

1.3 MISCELLANEOUS

1.3.1 Identification and Marking

The following markings are provided

1) DHHS complying label on the chassis
2) X-ray precaution label on the chassis
3) Fuse warning label on the shield cover
4) Information label on the chassis to show power source, model name, UL recognaized, serial number etc.

1.3.2 Spare parts.

Fuse (125V 3A 2 pieces)
Power cord (1.5m)

1.3.3 DOCUMENTATION

The following documents are arranged and supplied to users:

1) Service manual containing circuit descriptions, operating procedures, maintenance instruction, parts list and schematic diagram.
2) Specification
3) Drawings showing outline of equipment and details for installation.

SECTION 2
INSTALLATION

2.1 General

This section explains how to install the monitor and how to verify its basic operation. Like most commercial TV receivers, the monitor is thoroughly adjusted and checked out at the factory, but it may require certain minor adjustments to adapt it to a particular display generator or other controller and to compensate for minor adjustment because of disturbances during shipment. For convenient reference, complete adjustment procedures and other basic checks are consolidated in Section 3, but only selected, simple procedures should be necessary for initial installation.

2.2 Unpacking

The monitor is normally packed in a separate shipping container unless it is incorporated into a system by MITSUBISHI ELECTRIC CORPORATION. Carefully open the top of the container. Remove the inside packing material and lift out the monitor.

2.3 Assembly

The monitor is supplied completely assembled.

2.4 Caution Before "POWER ON"

Please make sure that PCBs, wires, components and structures are in perfect mechanical order and not damaged during transportation. Particular attention should be paid to the anode cap of the CRT.

2.4.1 Ventilation

The temperature inside of the cabinet must be kept below 55°C.

2.4.2 Leakage flux

Do not install the monitor nearby a transformer, fan or other leakage flux source.

2.4.3 Vibration

This monitor is designed to withstand vibration on the condition that the monitor is fixed to the cabinet by 4 Pcs of screw at bottom of the monitor.

2.4.4 Power Voltage

Check the position of a connector from degauss coil on PCB-MAIN. J902 --- 90∿132V / J903 --- 195∿265V

2.4.5 Horizontal Frequency

Check the Position of "HF-C" connector on PCB-MAIN.

HF3400/FHF3500 --- 30 ∿ 33kHz "Low ; 33 35kHz "Hi"
HF2400/FHF2500 --- 20 ∿ 23kHz "Low"; 23 25kHz "Hi"
HF1400/FHF1500 --- 15.5∿17.5kHz "Low"; 17.5 20kHz "Hi"

2.4.6 Input Signals

Make sure of the connection in the input connector in accordance with Fig. 6-1.
If the monitor is used without external sync. signal input, the green video signal input to the monitor must contain composite sync. signal.
Turn the sync. select switch (S303) on the PCB-VIDEO according to the input signal (EXT or INT).

2.4.7 Signal Cable

All signal cables between the monitor and generator must be constructed with 75Ω coaxial cable and terminated at the monitor cable end with standard BNC connector plugs.

SECTION 3
CIRCUIT DESCRIPTION

3.1 DETAILED DESCRIPTION

This section contains detailed descriptions of circuits operation for HF Series Color Display Monitor. In reading this section, reference should be made to the monitor schematic diagrams.

3.2 PCB VIDEO CIRCUIT

3.2.1 Video Amplifier

The color monitor contains three video amplifiers one for each primary color. These three amplifiers for red, green and blue CRT guns are identical. Therefore, the operation of only one channel (RED) is discribed here.

Composite Video Signal input from J211 is applied to a buffer amplifier, Q201. The contrast control can be individually set to allow matching of the CRT color levels. The output of contrast control is supplied to Q202 and Q203.

Q202 and Q203 compose a differential amplifier and amplifies the video signal. The output of this amplifier drives Q205. The bias of this amplifier is controled by contrust volume VR291 through Q204. Q205 amplifies still more the video signal. The output of Q205 is coupled to an emitter fpllower Q206 for impedance change. The output from the Q206's emitter is coupled to the driver Q207 for pedistal clamping. The video signal is clamped by the clamper Q207 and then drives Q301 on the PCB-CRT through Q208, Q209.

The output signal from Q301"s collector is transformed into low impedance by emitter-follower formed with Q302 and Q303, and applied to the cathode of the CRT through C302, L302, D302.
VR201 (R-CONT) is for adjusting the signal output voltage.
VR291 (CONTRAST) is adjustable the signal voltages of 3 colors at the same time, and controls the brightness of the screen.
VR301 (R-BIAS) is for adjusting the cut off voltages of cathode.
Electric discharge gap AG301 is prepared for the circuit protection at the time of flushover inside of the CRT.

3.2.2 Sync Separator

The sync separator is located on the PCB-VIDEO and operates from the green video input in the case of internal sync, or operates from the separate sync input. This selection is made by sync selection switch S303.
The green Video signal or separate sync signal is clamped by D301, D302 and amplified by Q301, Q302. This signal drives sync stripper Q303. When the negative going sync signal comes Q302's collector, Q303 is on through C303. When the positive video signal comes Q302's collector, Q303 is off. So the separated (positive) composite sync signal comes the collector of Q303. The attenuated positive sync signal (by R314, R315) is changed to negative signal by Q304 and fed to PCB-MAIN for horizontal sync. signal from the collector (negative). The positive sync signal comes the collector of Q303 and this signal is differentiated by C305 and R319. Q305 is normally biased in OFF state. Falling point of the positive sync signal (which are the trailing edges of the horizontal sync pulses) drive Q305 to ON state. The output of Q305's collector is a positive pulse during the back porch interval, which drives (Q207, Q237, Q267) the pedestal

clampers.
The integral circuit (R322, C306) and Q306 forms a kind of sync. separator to separate the vertical sync. When the vertical sync. signal comes, Q306 is ON and Q307 is OFF. The positive going signal for vertical sync. comes to Q307' collector.

3.2.3 DC Restoration

A back porch pulse from the sync separator circuit drives the gate of pedestal clamper Q207 through C211 and R223. During the back porch period, pedestal clamper Q207 is turned on by a positive pulse and provides bias to emitter-follower Q208 to maintain the pedestal level at the constant DC level.

3.3 HOLIZONTAL DEFLECTION CIRCUIT

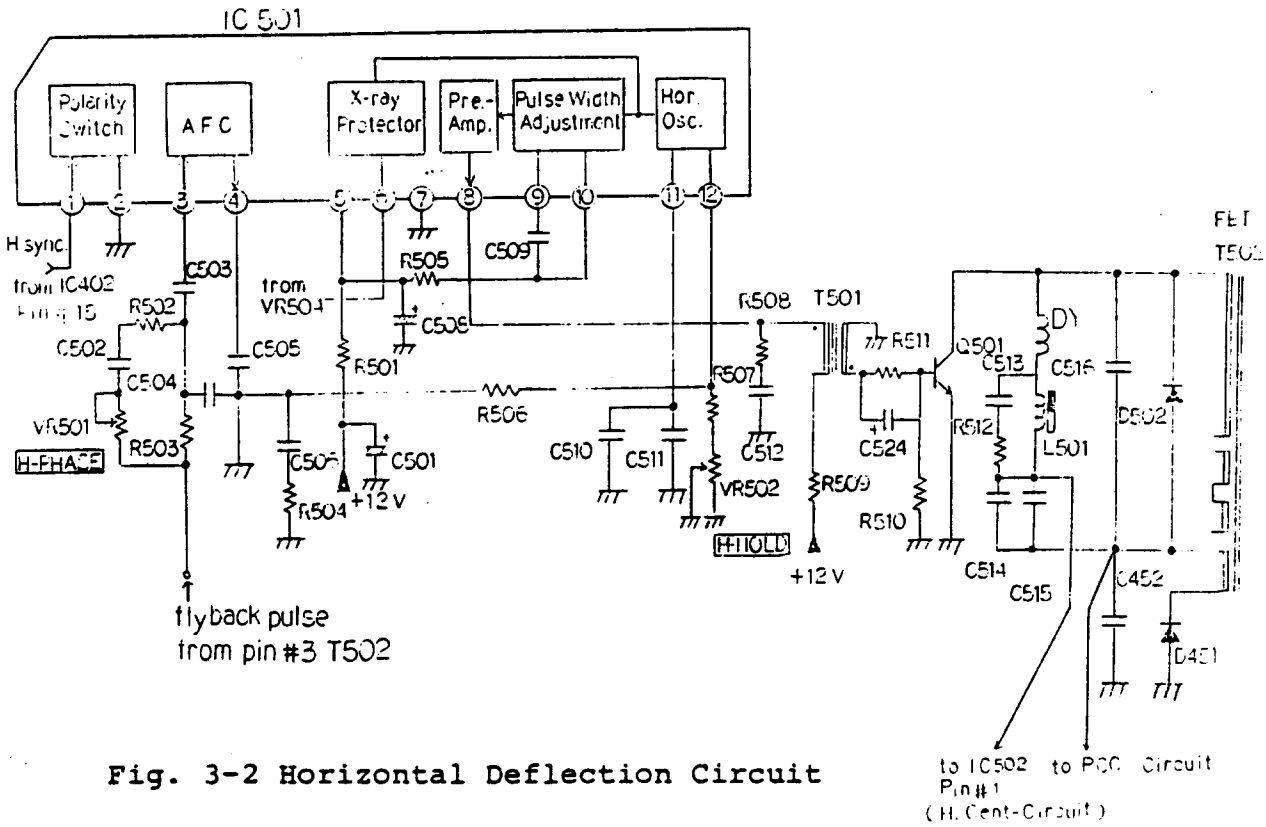


Fig. 3-2 Horizontal Deflection Circuit

Horizontal deflection circuit is composed of oscillator, drive and output stage.

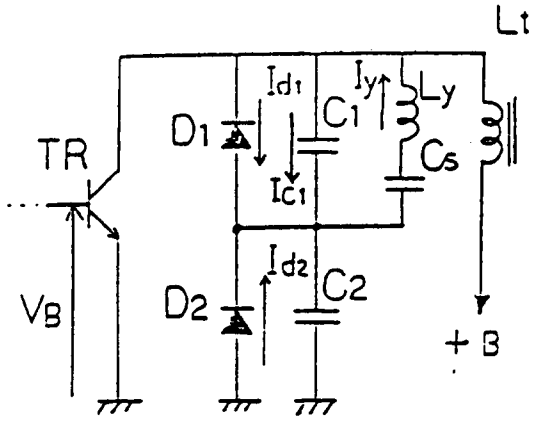


Fig.3-3

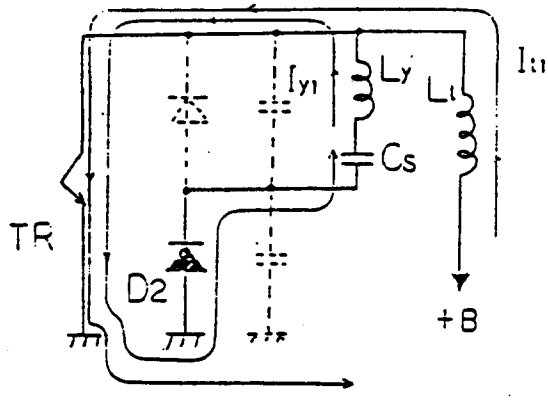


Fig.3-4

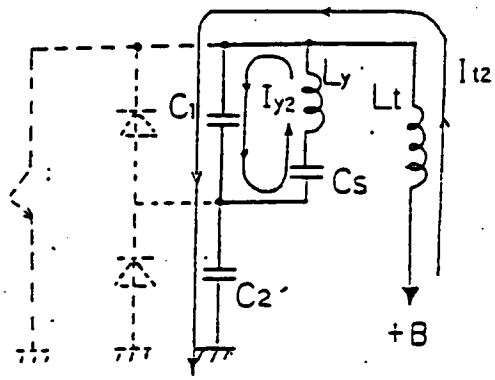


Fig.3-5

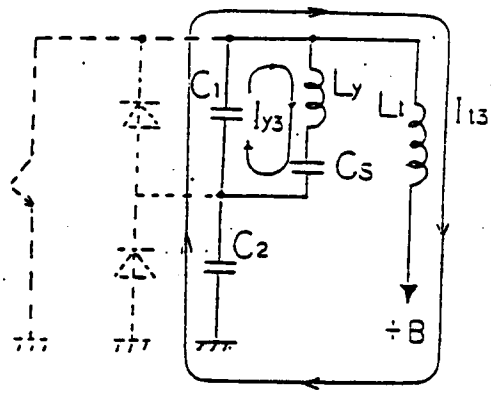


Fig.3-6

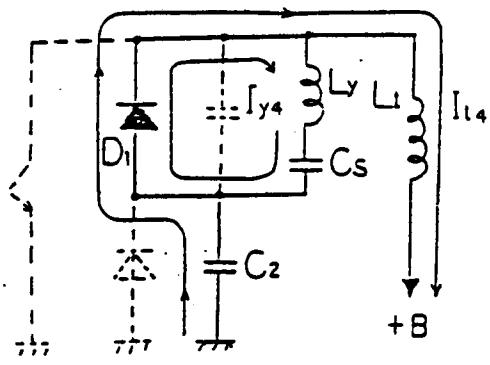


Fig.3-7

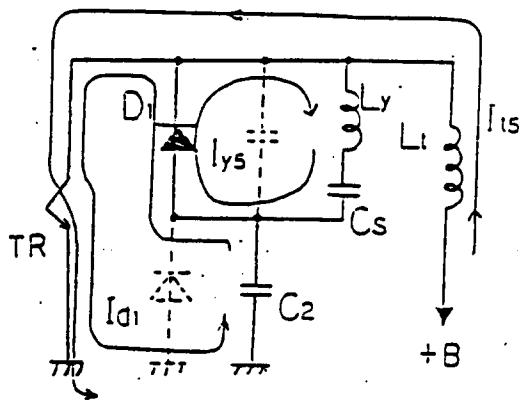


Fig.3-8

Not only as a deflection circuit, but also this circuit is used as a power supply of High voltage and so on.

Schematic diagram of horizontal deflection circuit is shown as Fig. 3-2.

3.3.1 Output Circuit

Fig. 3-3 is a fundamental diagram of horizontal deflection circuit. In this circuit, transistor TR acts as a switch.

Following, the action of this circuit is described using Fig. 3-3, Fig. 3-4, Fig. 3-5, Fig. 3-6, Fig. 3-7, Fig. 3-8 and Fig. 3-9.

When transistor TR is turned on at the time t_1, diode D_2 turn on, the current of deflection yoke Iy ($=Id_2$) and the current of flyback transformer It increases linearlly as shown Fig. 3-4.

When TR is opened at a suitable time t_2, current Id_2 becomes zero at once, and flows into capacitor C_1, and oscillates. The current It doesn't become zero at once too, and flows into

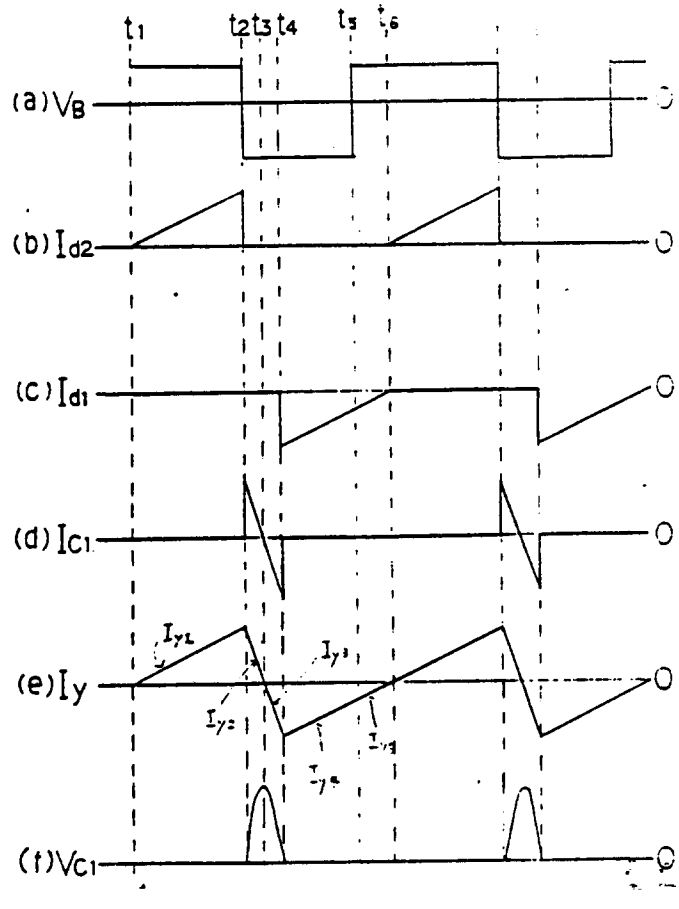


Fig. 3-9 Wave form of each part

capacitor C_1, C_2, and oscillates. The current Iy, It are shown as Iy_2, Iy_3, It_2 and It_3 in Fig. 3-5 Fig. 3-6.

At the time t_4 when the retrace period is finished, Iy ($=Ic_1$) becomes maximum reverse. Then diode D_1 is turned on, the oscillation stops, current Ic_1 becomes zero at once.

The energy flows out during the time from t_1 to t_2, and at the time t_4 the energy flows back to the power supply, therefore power loss of this circuit is small. During the period from t_2 to t_4, the current Iy depends on resonance frequency of Ly and C_1. During this period, Iy changes from positive peak to negative peak, and the voltage between both sides of C is shown as Fig. 3-9-(f).

When diode D_1 turn on, the current Iy ($=Id_1$) decreases linearlly as shown in Fig. 3-7. At the time t_5 when transistor TR is turned on, Iy continues to decrease until the current reaches zero as shown in Fig. 3-8.

DC voltage from + 70V power supply is supplied to T502 and makes 24 kV power supply for Anode of CRT, and it supplies the pulse to AFC circuit and makes -100 volts power supply for the G_1 of CRT.

In the practical circuit there are resistance element of the circuit, therefore deflection current of the deflection yoke does not change lineally. To correct it, linearity Coil L501 is prepared in series of the deflection Yoke. As to horizontal linearity, because of the CRT curveture, there is a tendency to extend in the both sides.

To correct it, capacitor C514 and C515 are connected in series to the deflection yoke.

The Horizontal width adjusting circuit and PCC circuit in IC451 is connected in series to the deflection yoke.

3.3.2 Horizontal Centering Circuit

VR503 (H-CENT) is adjustable the DC current of the deflection yoke, and shifts the raster in horizontal direction.

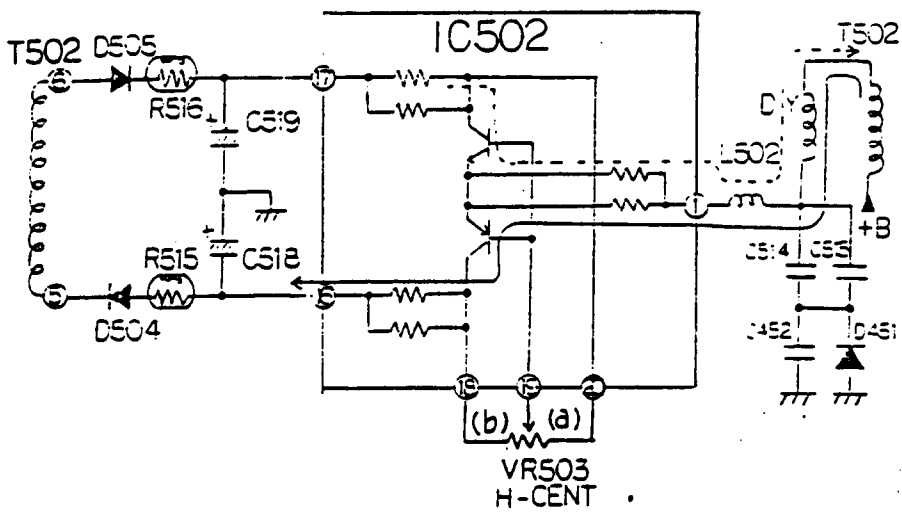


Fig. 3-10

In above figure, there exists retrace pulse between pin #5 and #6 of T502, D505, D504, C518 and C519 supply DC voltage by rectifying the retrace pulse.

In case VR503 inclines to side (a), the current flows like the dotted line and the raster moves to right.

In case VR503 inclines to side (b), the current flows like the real line and the raster moves to left. This changing width is approximately ±9mm.

3.3.3 Horizontal Oscillator and Driver

All signal processing is performed by IC501, DC voltage is applied to the pin #5. The oscillation frequency depends on the charge and discharge time constant of C510, 511 and R507, VR502 which can be adjusted by VR502 (H-HOLD).

The saw tooth wave voltage supplied here is changed to rectangular wave in order to drive Q501, and supplied to pin #8 through the pulse width adjustment circuit and pre-amplifier circuit. The width of output pulse depends on the time constant of CR circuit formed with C509 and R505.

The horizontal sync signal flowed into pin #1 and VR502 (H-HOLD) adjusts oscillating frequency to be synchronized with input signal frequency.

The flyback pulse from pin #3 of flyback transformer T502 is applied to the Automatic frequency control circuit for synchronization stability. It is supplied to pin #3 through the integrating circuit formed with R503 and C504.

VR501 (H-PHASE) is prepared for adjusting the relative position between the raster and picture position.

To get enough drive voltage, pre-amplifier is prepared in IC501.

This circuit supplies forward base current enough to saturate the output transistor Q501 and reverse base current enough to be turn off Q501.

3.4 PCC circuit

In this monitor, side pincushion shown as Fig. 3-11-(a) is compensated by following method.

Horizontal deflection current is modulated shown as Fig. 3-11-(b)

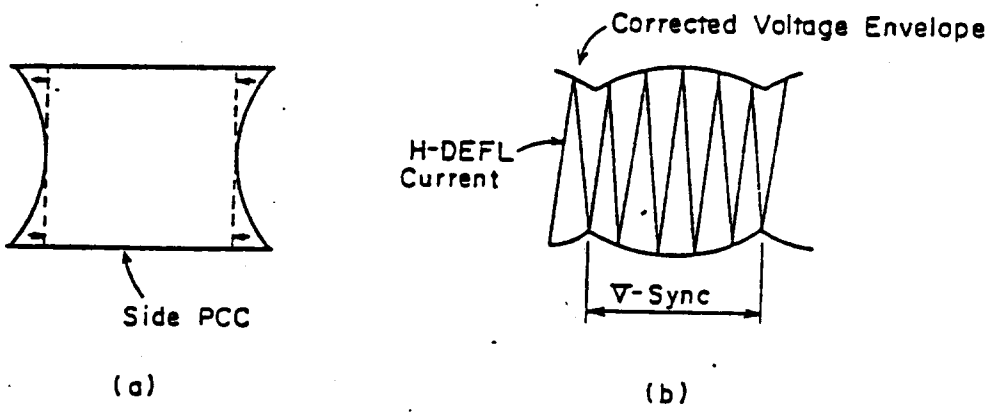


Fig. 3-11 Side PCC and Waveform of PCC Circuit

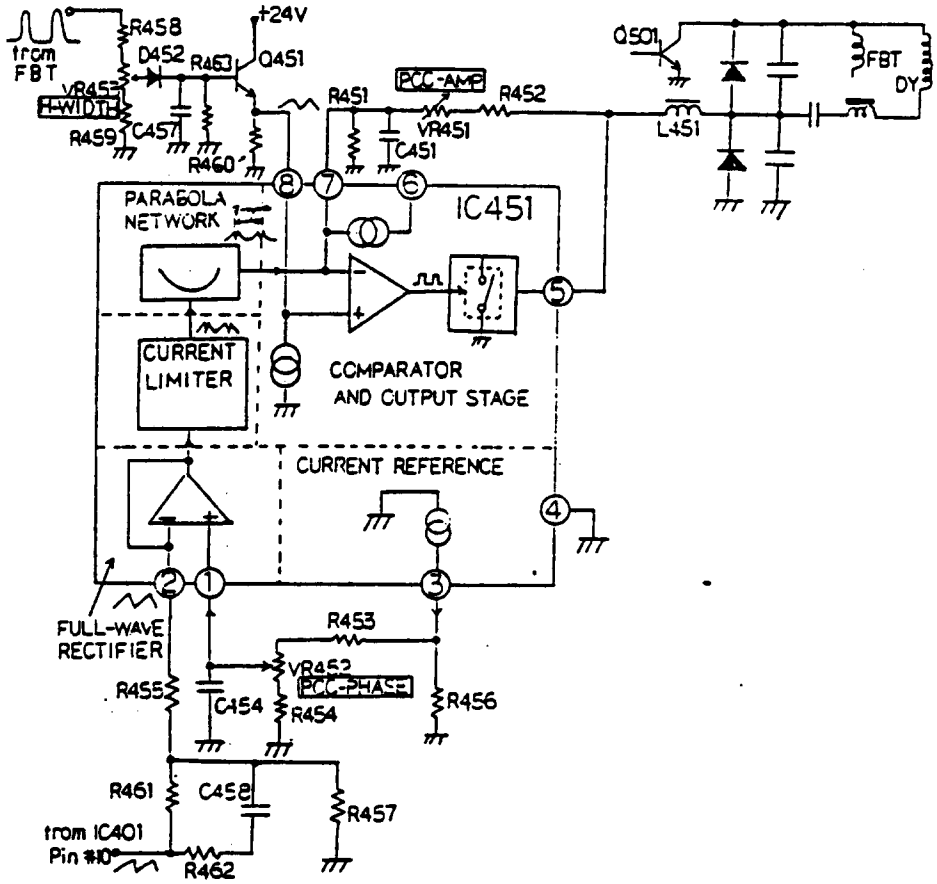


Fig. 3-12 PCC/H-WIDTH Circuit

The sawtooth wave voltage is supplied from vertical circuit to pin #2 of IC451. Pin #2 is connected to Full-Wave Rectifier. Then the sawtooth wave is rectified, and it is added to comparator through current limiter and parabola network.

The flyback pulse is applied to integrating circuit formed with R458, VR453 and C457. Then, the sawtooth wave voltage which is output of integrating circuit is added to pin #8 of IC451. Pin #8 is connected to comparator.

The horizontal sawtooth wave voltage is compared with the vertical parabolic voltage in comparator, and output of comparator is applied to output stage.

As a result, the horizontal yoke current is modulated as a function of vertical deflection, so the side pincushion distortion is corrected.

VR451 (PCC-AMP) adjusts quantity and VR452 (PCC-PHASE) adjusts position of correction.

VR453 (H-WIDTH) can adjust the holizontal raster width.

3.5 High voltage Output Circuit

This is the circuit for supplying stable DC high voltage to CRT anode. The high voltage output circuit is driven by horizontal deflection drive circuit.

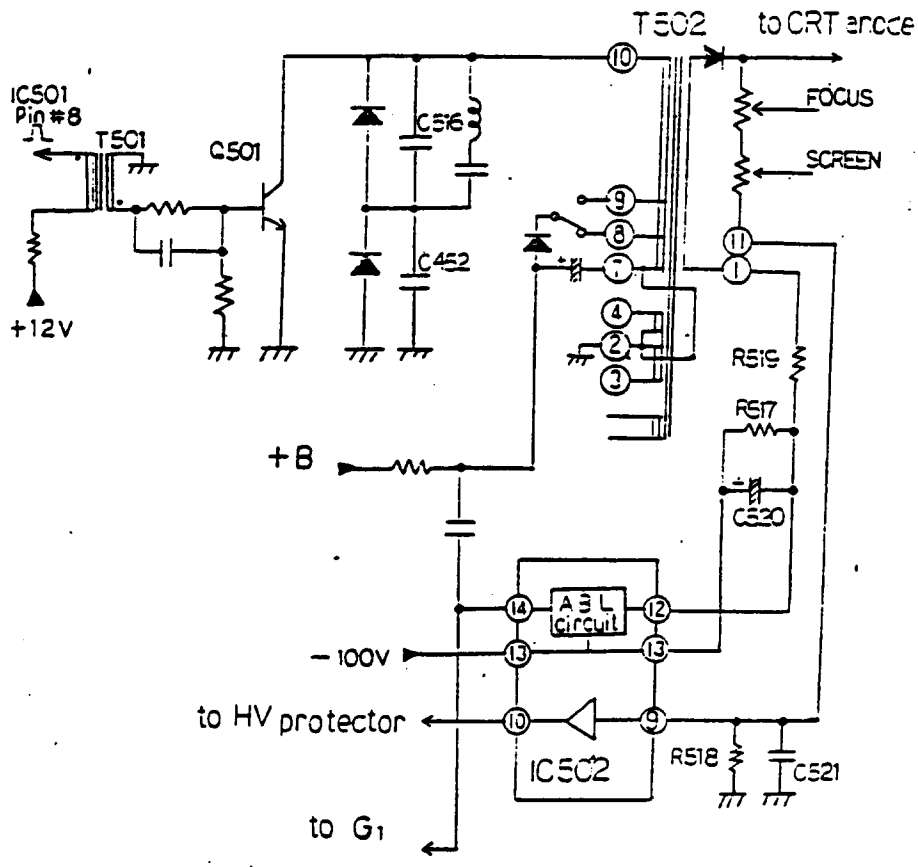


Fig. 3-13 High Voltage Output Circuit

The rectangular wave voltage is applied to Q501 through T501. The voltage wave shown as Fig. 3-9-(f) is obtained at pin #10 of T502. This flyback pulse is boosted to more than 20 kV by T502, and rectified by the diode and capacitor inside of T502 and the capacity in the CRT.

3.6 High Voltage Safety Circuit

Fig. 3-14 shows two high Voltage Safety Circuits.

If high voltage reaches to a certain designed level above 27 kV, the safety circuit 1 begins to operate and cuts off high voltage drive circuit, so this circuit keep X-Radiation within permitted quantity.

In safety circuit 1, anode voltage is divided by focus block and R518, and this divided voltage is divided by R520, VR504 and R521 through butter amplifier Q2 (IC502), and fed to pin #6 of IC501 through zenner diode D508.

If high voltage increases by some causes, the devided voltage also increases, the voltage at the VR504 increases.

If the voltage of pin #6 exceeds certain voltage, then Q77 turns on and pull down the Output-line of horizontal oscillator to ground so that horizontal OSC circuit stops the operation. As the result, high-voltage generation is dropped to zero due to no pulse generation.

If safety circuit 1 is failure and high voltage increases above 29 kV, then safety circuit 2 begins to operate and makes the picture unvisible. In safety circuit 2, flyback pulse is devided by R1 and R2(in IC502) and added to pin #10 of IC402 as shown Fig. 3-14. If the voltage of pin #10 exceeds certain voltage, then safety circuit 2 begins to operate and vertical oscillator stops the operation.

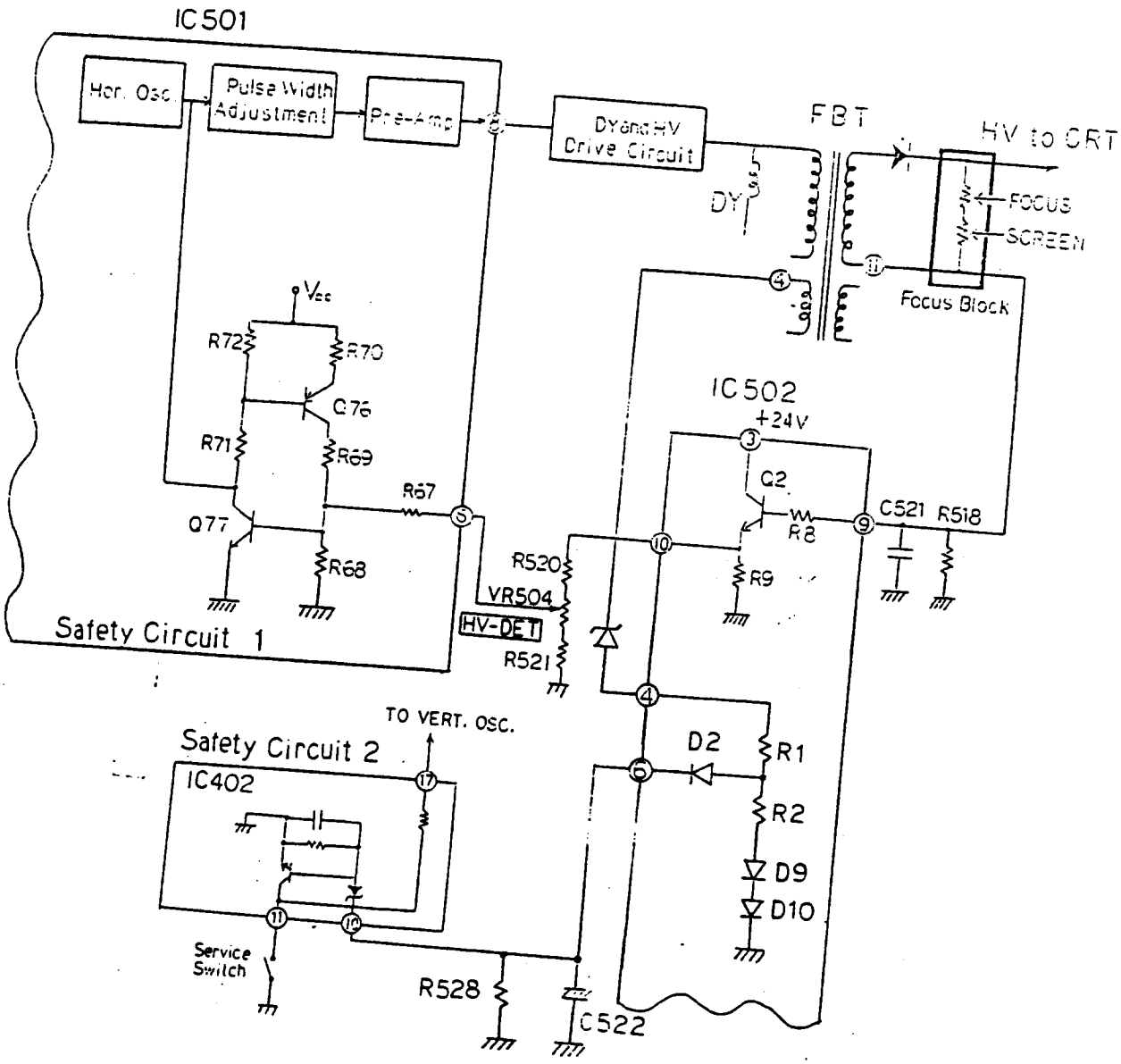


Fig. 3-14 High Voltage Safety Circuits

3.7 Vertical Deflection Circuit

Schematic diagram of the vertical deflection circuit is shown as follows.

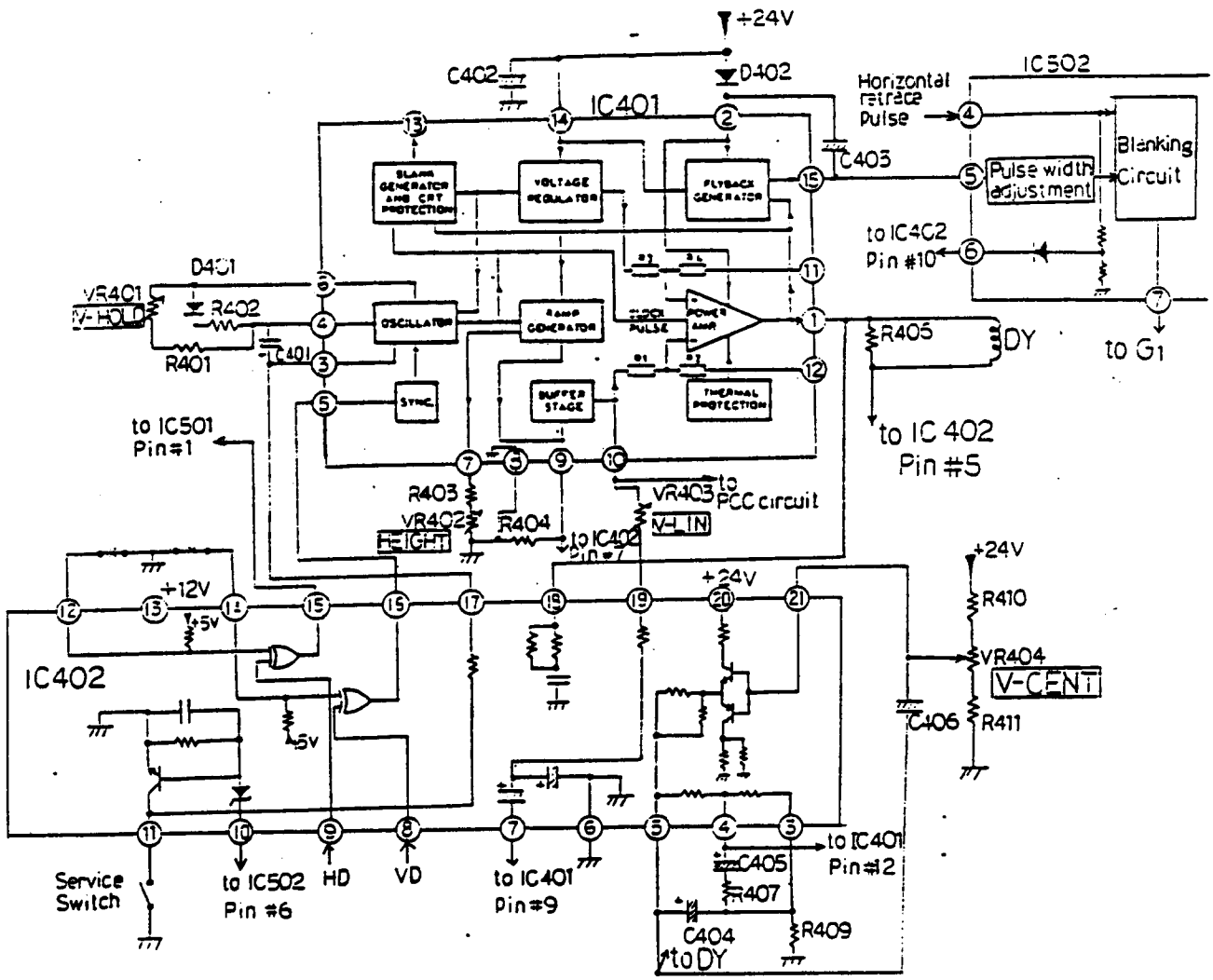


Fig. 3-15 Vertical Deflection Circuit

All signal processing is performed by IC401.
The vertical sync pulse is applied to oscillator in IC401. The oscillating frequency depends on the charge and discharge time constant of C401 and R401, VR401 which is adjustable by VR401 (V-HOLD) connected to pin #6.

Oscillating frequency can be adjusted to be synchronized with input signal by VR401.

The output signal of oscillator is applied to ramp generator. The output of ramp generator is sawtooth wave, and applied to power amp through the bufter stage. In order to correct the linearity of the screen, the deflection current is adjusted by VR403 (V-LIN) connected to pin #10. And VR402 (V-HEIGHT) adjusts the vertical amplitude. VR404 (V-CENT) adjusts vertical position of the raster.

The sawtooth wave current is applied to deflection yoke through pin #1 of IC401, and makes the magnetic field in proportion to the current amplitude to deflect the electron beam.

For blanking circuit, the vertical retrace pulse is generated by Flyback Generator in IC401, and added to pin #5 of IC502 through pin #15 of IC401.

3.8 PCB-Power circuit

Power Regulator Circuit

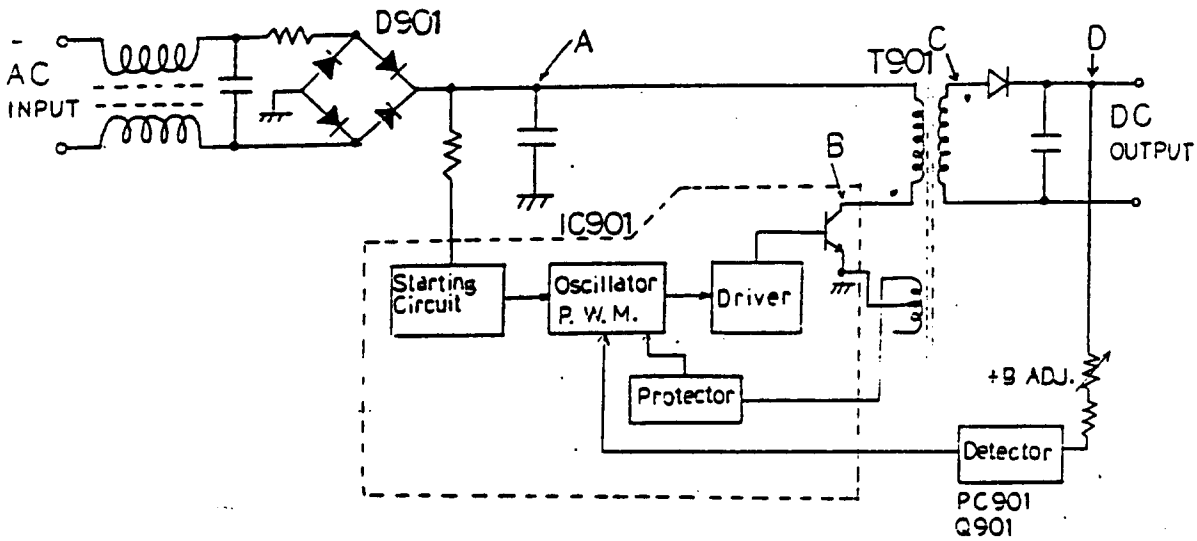


Fig. 3-16 Fundamental Circuit

3.8.1 Rectifier circuit

Input alternative voltage is rectified by a bridge rectifier which is composed of D901, C904 and C905. D901 is formed with four diodes, D_1, D_2, D_3 and D_4.

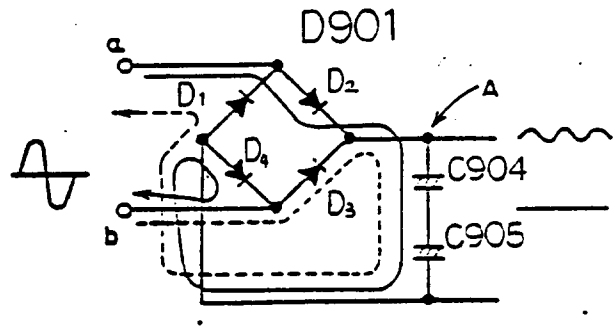


Fig. 3-17 Bridge Rectifier

When terminal "a" is positive, current flows C904, C905 through D_2 and charge up, and at next half cycle, terminal "a" is negative, current flows C904, C905 through D_3.

3.8.2 Output circuit

Rectified DC voltage is switched by switching transistor of IC901, and switched voltage is obtained at "B" point.

Secondary rectifier circuit

At "C" point of output transofrmer T901 secondary circuit, switching pulse, which is same polarity of "B" is induced and rectified by diode and capacitor. At "D" point, rippleless DC voltage is obtained.

In the practical circuit there are four secondary rectifier circuit, and DC voltages +24 volts, +12 volts +6.3 volts and +70 volts are obtained.

3.8.3 Oscillator, driver

All processing of Oscillation and drive circuits are performed in IC901, therefore in this section, the part of each pin and additional circuit are explained.

At power on, DC voltage is supplied to pin #1 and pin #3 of IC901, and IC901 begins to operate. After that, in order to obtain DC power, pulses are supplied from terminal 5 and terminal 3 of T901 to pin #9 and Pin #12. +10V DC voltage is made by diode (inside of IC901, connected to pin #9) and C907, obtained from pin #8.-10V DC voltage is made by diode (inside of IC901, connected to pin #12) and C908, obtained from pin #11.

The DC voltage for driver circuit is applied to pin #10 from pin #8 through R913, R912.

The switching transistor inside of IC901 is connected to pin #16 and pin #14.

3.8.4 Voltage control circuit

At secondary circuit of transformer T901, switched voltage appears and it is made into DC voltage changes according to input voltage or load current, but it is stabilized as mentioned below. At "C" point of secondary circuit of T901, E' voltage which is same polarity as primary circuit generates as shown Figure (C). E' is proportional to primary circuit voltage E, that is, depending directly on voltage variation at "B" point.

In order to stabilize DC output voltage, it is necessary to control E_1' to get constant value. In this display monitor, to realize above purpose, pulse width control system is adopted.

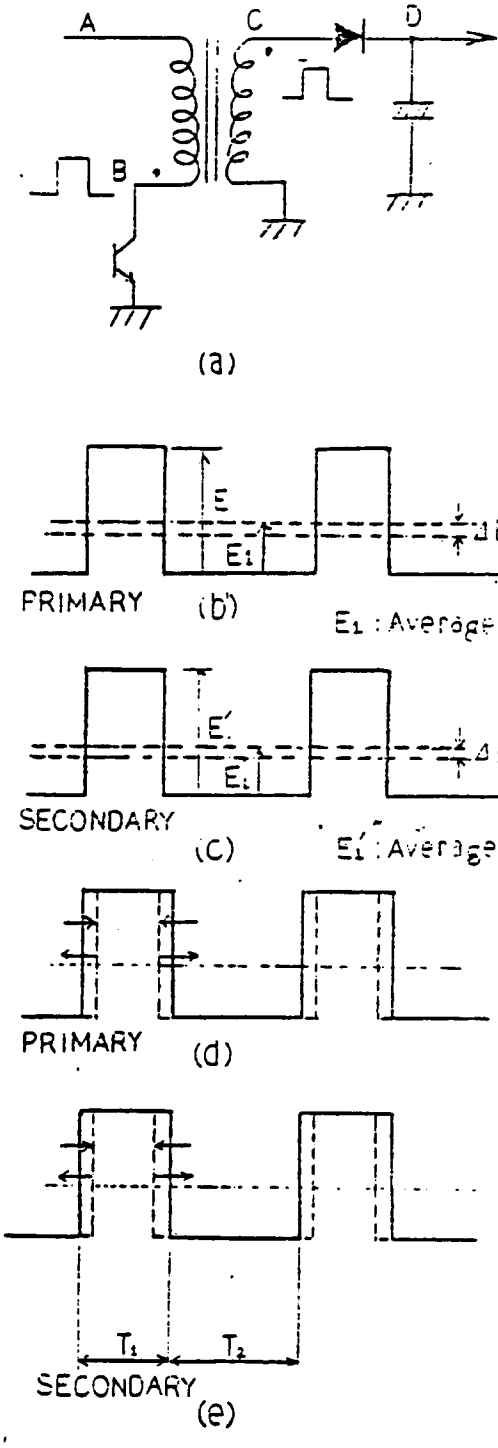


Fig. 3-18 Voltage Control

Switching voltage signal at primary circuit of T901 is proportional to DC supply voltage at "A", if E_1' changes by ΔE_1 as shown Figure (c), E_1' voltage can be stabilized by changing pulse duty ratio as shown Figure (d), (e).

For example, when input voltage increases and pulse amplitude goes up, constant E_1' voltage can be obtained by setting T_1/T_1+T_2 smaller. On the contrary when input voltage decreases and pulse amplidude goes down, E_1' voltage can be compensated by setting T_1/T_1+T_2 bigger.

3.8.5 Error Amplifier

In order to do above control, output DC voltage deviation is detected by transistor Q901 and photocoupler PC901, and applied to pin #7 of IC901. For example, if output DC voltage increase, Q901 base voltage increases, and Q901 corrector current increases, impedance between pin #5 and pin #4 of PC901 changes to lower.

The reason why photocoupler is used for transfering output voltage variation is for insulation between primary circuit and secondary circuit.

3.8.6 Protector for over current and over voltage

In IC901, there are protectors for over current and over voltage.

If over current flows in primary circuit, voltage of pin #14 connected to R916 increases, and applied to pin #6, then, the pulse width of output changes narrower, and load current changes smaller.

When the output voltage increases, the amplitude of pulse from terminal 5 of T901 increases too, and DC voltage obtained from pin #8 increases. Pin #8 is connected to pin #5 through R926. If the voltage of pin #5 reaches to a certain designed voltage, the over-voltage protector begins to operate, and the pulse width of output changes smaller.

3.9 Automatic Degaussing Circuit

Posisters RP901, RP902 and degussing coil L991 composed a automatic degaussing circuit to demagnetize the shadow mask and internal shield in the CRT.

Posister shows low resistance value in nornal temperature. When apply AC line voltage, current flows in degussing coil, and after seconds, resistance of posister increases rapidly by itself heating and degaussing current decreases.

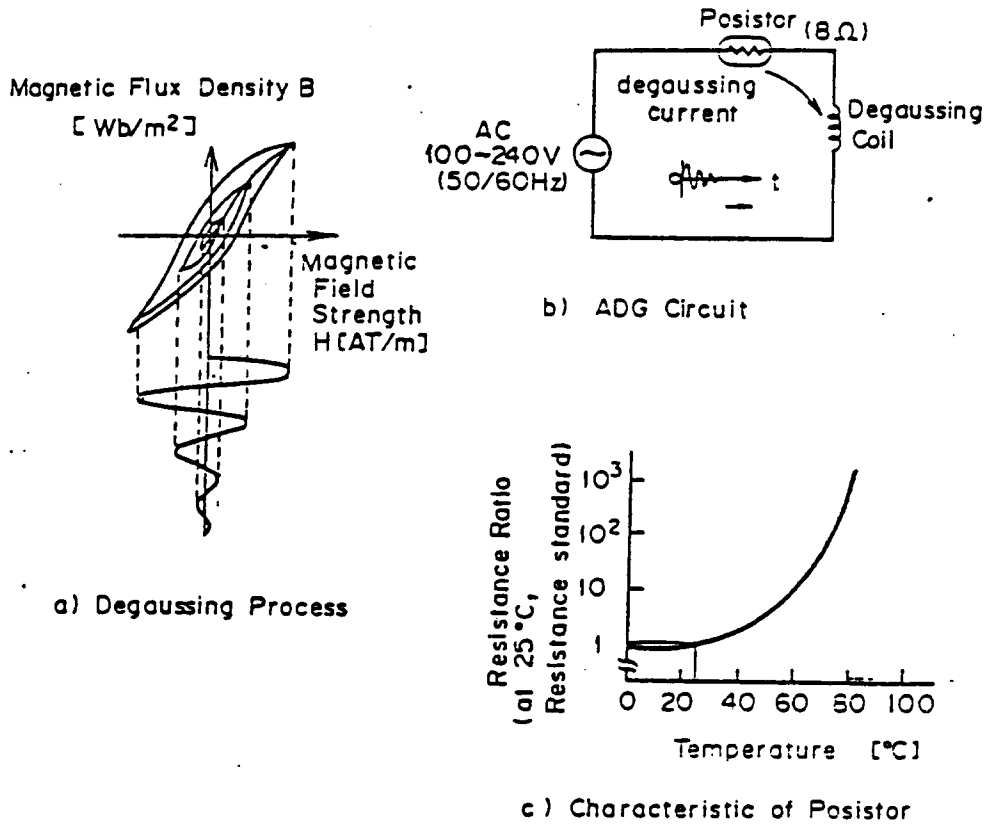


Fig. 3-19 Automatic Degaussing Circuit

SECTION 4
MAINTENANCE

SAFETY PRECAUTIONS

Observe all caution and safety related notes located on the monitor chassis

1. EMI Warning

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of part 15 of FCC Rules. Which are designed to provide resonable protection against such interference in a residential installation. However, ther is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception. Which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient the receiving antenna

Relocate the computer with respect to the receiver

Move the computer away from the receiver

Plug the computer into a different outlet so that computer and receiver are on different branch circuit.

If necessary, the user should consult the dealer or an experienced radio/television technican for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpfull;

"How to Identify and Resolve Radio-TV Interference Problems".

This booklet is available from U.S. Government Printing Office, Washington, DC 20402. Stock No. 004-000-00345-4.

2. Safety Warning

1. Operation of this monitor without cover or cabinet, involves a shock hazard from the monitor power supplies. Work on the monitor should not be attempted by any one who is not throughly familiar with precautions necessary when working on high voltage equipment.

2. Do not install, remove or handle the picture tube in any manner unless shatter-proof goggles are worn. People not so equipped should be kept away while handling picture tube. Keep picture tube away from the body while handling.

3. X-Radiation Warning
The surface of picture tube may cause X-radiation. Precaution during servicing and if it possible use of a lead apron or metal for shielding is recommended. To avoid possible exposure to X-Radiation and electrical shock hazard, the high voltage compartment must be kept in place whenever the chassis is in operation. When replacing picture tube, use only designated replacement part since it is a critical component with regard to X-Radiation at noted above.

4. Product Safety Warning
Many electrical and mechanical parts in color display monitor have special safety related characteristics. These characteristics are often not evident from visual inspection, not can be protection afforded

by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the service manual. Electrical components having such features are identified by shading on the schematic diagram and the parts list of the service manual and by marking on the supplementary sheet for this chassis to be issued subsequently, therefore replacement of any safety parts should be identical in value and characteristics.

ALIGNMENT PROCEDURE

Monitor alignment procedures contained in this section should be follow whenever a major component is replaced: such as CRT or PCB board.

Some alignment may also be required periodically to correct for component ageing. Degaussing should be performed periodically whenever it is suspected that degaussing is required. These alignment procedures should be performed in the order given herein. Due to interaction, some portions of the alignment procedures may require repeating.

For quick reference, all maintenance adjustments are listed Table 4-1, together with the location, circuit de signator and related paragraph for each control. Figure 4-2 through 4-6 shows the location of all adjustments.

In the following alignment procedures it is assumed that proper line voltage and frequency are available. A video source with proper line rate is required for application to the red, green, and blue inputs.

After all inputs have been connected, the Horizontal Hold (VR502) and Vertical Hold (VR401) must be adjusted for a stable picture. Approximately 20 minutes should be allowed for warm-up before proceeding.

Table 4-1 MAINTENANCE ADJUSTMENTS

	Name	Location	Symbol	Function
1.	Hor. Hold	PCB-MAIN	VR502	Horizontal deflection frequency
2.	Vert. Hold	PCB-MAIN	VR401	Vertical deflection frequency
3.	+70V DC	PCB-MAIN	VR901	The cathode voltage of D906 is adjusted to be 70V.
4.	Width	PCB-MAIN	VR453	The horizontal size of picture
5.	Height	PCB-MAIN	VR402	The vertical size of picture
6.	Vert. Linearity	PCB-MAIN	VR403	Vertical linearity of picture
7.	Hor. Centering	PCB-MAIN	VR503	Position of horizontal raster
8.	Vert. Centering	PCB-MAIN	VR404	Position of vertical raster
9.	Video Phase	PCB-MAIN	VR501	The horizontal center of picture within raster
10.	Side PCC Amp.	PCB-MAIN	VR451	The compensation amount for side pincushion
11.	Side PCC Phase	PCB-MAIN	VR452	The phase of compensation for side pincushion
12.	Focus	PCB-MAIN		Focus voltage of tube
13.	Bias -Red	PCB-CRT	VR301	Picture brightness of each color
	-Green	PCB-CRT	VR331	by changing Cathode voltage
	-Blue	PCB-CRI	VR361	*Make sure that no video signals are need during this adjustment. Set the brightness control to be no raster. Turn on the service switch. Adjust the brightness control to just see a horizontal line of a faint raster. Adjust the bias controls of two darker channel. Turn off the SW401.
14.	Service Switch	PCB-MAIN	SW401	
15.	Brightness	PCB-MAIN	VR505	

Name	Location	Symbol	Function
16. Contrast-Red	PCB-VIDEO	VR201	Picture brightness of each color by changing amplitude of video signal
-Green	PCB-VIDEO	VR231	
-Blue	PCB-VIDEO	VR261	
17. Contrast	Side Panel	VR291	Picture brightness by changing amplitude of video signals

4.1 Setting

4.1.1 Set the control VRs as following

a. Center position

PCB-MAIN VR401, VR402, VR403, VR404, VR451, VR452, VR453, VR401, VR502, VR503, VR505, VR901, FOCUS

PCB-VIDEO VR201, VR231, VR261

b. Full counter clockwise position

PCB-CRT VR301, VR331, VR361

PCB-MAIN VR504

c. Full clockwise position

Side panel VR291

4.1.2 Insert the connector from degauss coil on PCB-MAIN, according to the AC line input voltage as follows.
J902 --- 90∿132V/J903 --- 195∿265V

4.1.3 Insert the "HF-C" connector on PCB-MAIN according to the horizontal frequency of Input signal as following.

"Low" : HF3400/FHF3500 -- 30 ∿ 33kHz
HF2400/FHF2500 -- 20 ∿ 23kHz
HF1400/FHF1500 -- 15.5∿17.5kHz

"High" : HF3400/FHF3500 -- 33 ∿ 35kHz
HF2400/FHF2500 -- 23 ∿ 25kHz
HF1400/FHF1500 -- 17.5∿20kHz

4.2 Degaussing

The display monitor should be degaussed before set-up and adjustment procedure are performed. The display monitor is equipped with Automatic Degaussing Circuit.

Other parts of the monitor may also require degaussing. This would be indicated by poor color purity or convergence which cannot be corrected by normal alignment. Degaussing of the monitor chassis is performed manually by using a commercial degaussing coil. The following procedure should be adhered to when using a degaussing coil:

a. With coil switch in the OFF position and the degaussing coil 6 to 8 feet from, and perpendicular to the screen, turn the switch to the ON position.

b. Turn the coil parallel to the screen and, with a circular motion, slowly bring the coil to the monitor.

c. Continuing the circular motion, pass the coil over the front, top, and sides of the monitor for approximately two minutes.

d. Then, moving in a circular motion and with the coil perpendicular to the monitor, slowly back away 6 to 8 feet and turn the coil switch OFF.

NOTE: Degaussing Coil - HOZAN, Type HC-21 recommended

4.3 Horizontal and vertical hold controls

Set Hor. Hold (VR502) and Vert. Hold (VR401) on the PCB-MAIN for suitable picture.

4.4 DC source voltage adjustment

a. Check the AC input line voltage is within 90∿132 AC or 180∿265V AC

b. Supply a line voltage to the PCB-POWER through the connector (J901).

c. Connect the DC voltmeter to the lower part of R301 on the PCB-CRT and the chassis. Adjust +B1 Control (VR901) on the PCB-MAIN at DC 70V.

4.5 H.V. limiter adjustment

Input signal must be Non-Video signal.

a. Remove a line voltage.

b. Connect a high voltage meter between the anode cap of CRT and the chassis.

c. Supply a line voltage.

d. Turn Contrast VR (VR291) full counter clockwise.

e. Turn H-HOLD VR (VR502) gradually counter clockwise, Check the High Voltage Safety Circuit operates under 27.5kV.

f. Remove a line voltage.

g. Reset H-HOLD VR (VR502) to the center position and supply a line voltage.

h. Adjust H-HOLD VR (VR502) for stable picture.

N O T I C E

HV-DET (VR504), Fly back transformer and other parts identified by shading on the schematic diagram and the parts list are critical components and never adjust or replace these components in the field servicing.

4.6 Width and height adjustment

a. Select a OUT-LINE test pattern

b. Adjust Hor. Width Control (VR453) and Vert. Height Control (VR402) for a OUT-LINE pattern size.
WIDTH × HEIGHT : 255 × 190 mm

4.7 Vertical linearity adjustment

a. Select a cross-hatch test pattern

b. Adjust Vert. Linearity Control (VR403) for Uniform spacing of cross-hatch at top/bottom and center of viewing area.

4.8 Side PCC adjustment

a. Select a cross-hatch test pattern

b. Observe the vertical lines at the left and right sides, adjust PCC Phase Control (VR452) and PCC Amp Control (VR451) on the PCB-MAIN to obtain straight vertical edges at the right and left sides of the screen.

4.9 Vertical centering adjustment

a. Select a OUT-LINE test pattern

b. Adjust Vert. Centering Control (VR404) to center the raster on the screen.

4.10 Horizontal centering adjustment

a. Select a OUT-LINE test pattern.

b. Adjust Horizontal Centering Control (VR503) to center the raster on the screen.

4.11 Video phase adjustment

a. Select a OUT-LINE test pattern.

b. Ensure Hor. Hold Control (VR502) has been adjusted

c. Adjust Brightness Control (VR505) and Contrast Control (VR291) for a picture of suitable contrast with the dim raster.

d. Adjust Hor. Phase Control (VR501) to center the OUT-LINE picture on the raster.

4.12 Gray scale tracking adjustment

4.12.1 Cathode Bias and Screen Bias adjustment
Input signal must be Non-Video signal

a. Turn the Contrast Control (VR291) fully counter-clockwise

b. Turn on the Service Switch on PCB-MAIN and Adjust Brightness Control (VR505) to see a dim Horizontal line.

c. Adjust the R.G.B - Bias Controls (VR301, VR331 and VR361) as required to equalize the three beam intensities resulting a gray raster

d. Turn off the Service Switch

e. Adjust Brightness Control (VR505) and Contrast Control (VR291) for a picture of suitable contrast with the dim raster.

4.12.2 Video Drive adjustment

a. Prior to performing the video drive adjustment, the cathode bias and screen bias adjustment must be proper.

b. Select a WHITE-FIELD test pattern.

c. Set the Contrast Control (VR291) to the center of the range.

d. Set the three Contrast Controls (VR201, VR231 and VR261) on the PCB-CRT fully clockwise position.

e. Observe the highlight color and adjust the three Contrast Controls (VR201, VR231 and VR261) to obtain white highlights.

4.13 Focus Adjustment

a. Select a DOT test pattern

b. Adjust the contrast Control (VR291) for a normal display.

c. Adjust the Focus Control located High Voltage resister block for best overall focus, observing both the center and corners of the screen.

Fig. 4-1 INPUT CONNECTOR

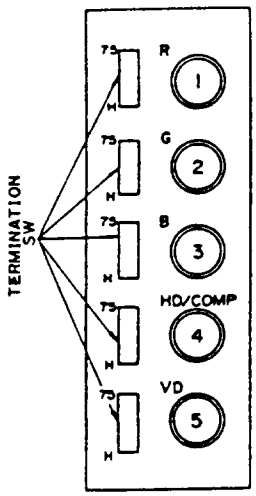


Fig. 4-2 PCB-VIDEO

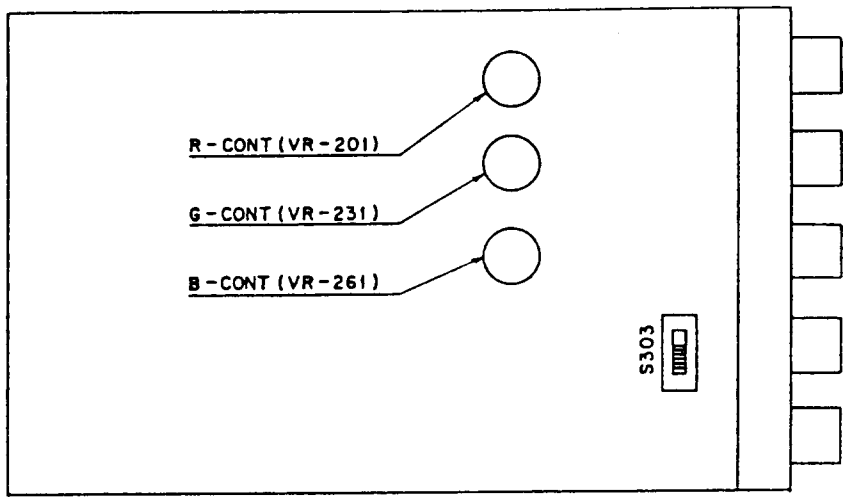


Fig.4-3 PCB-CRT Controls

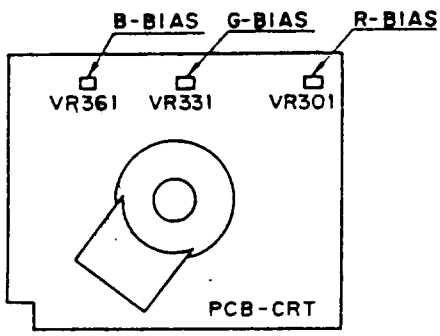
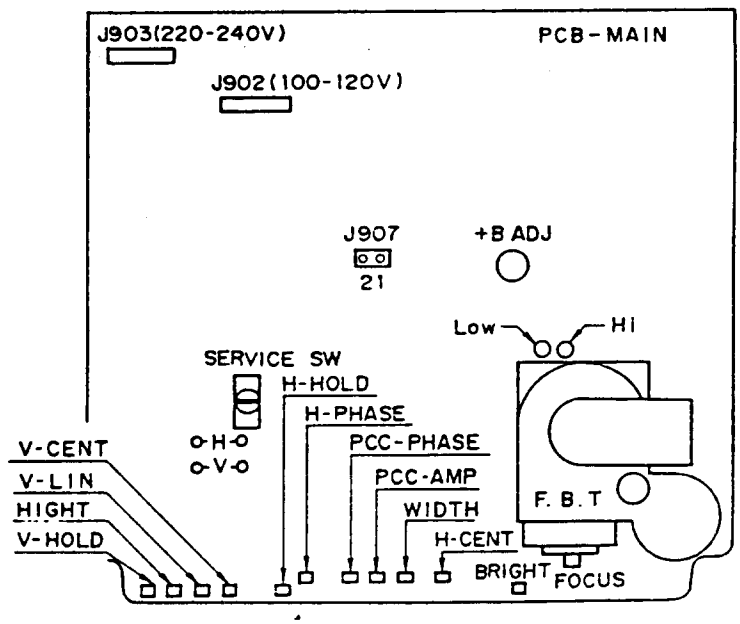
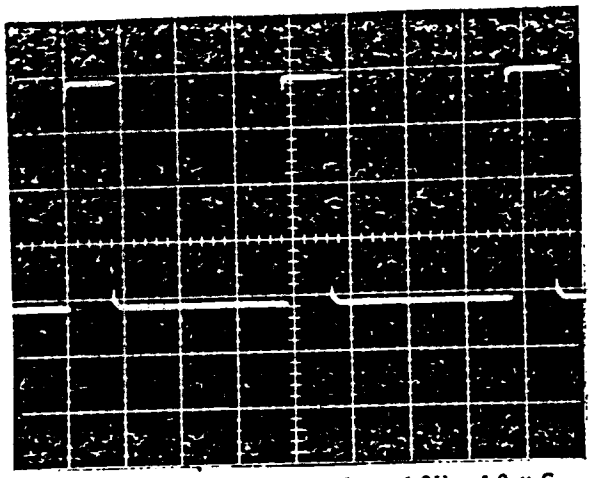
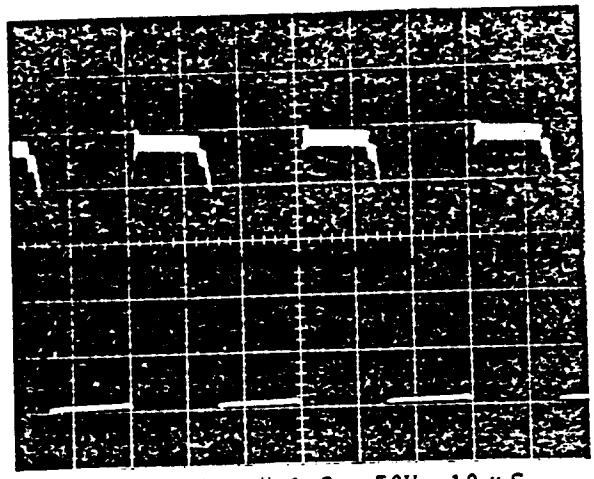


Fig. 4-4 PCB-MAIN

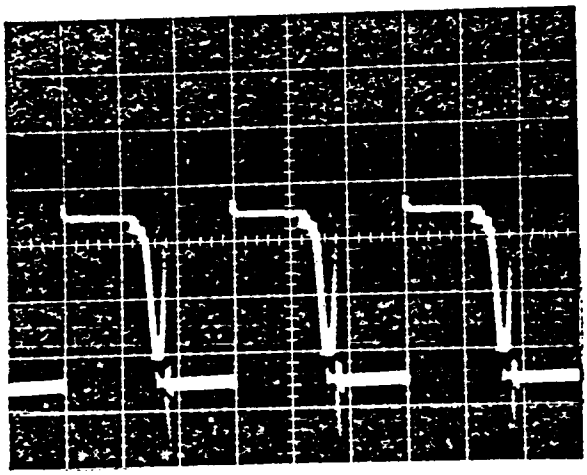




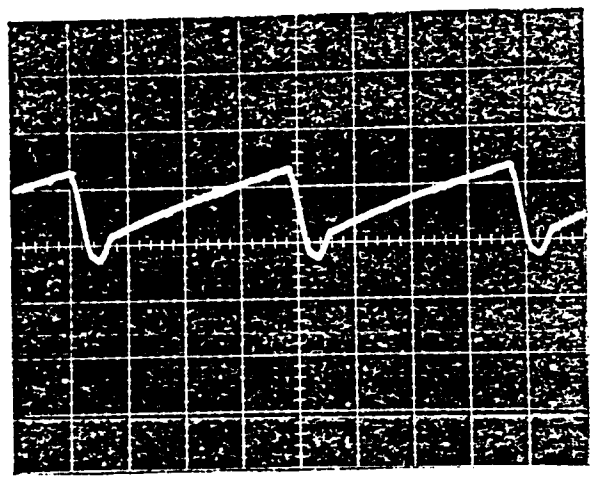
(1) C R T – Cathode , 10V , 10μS



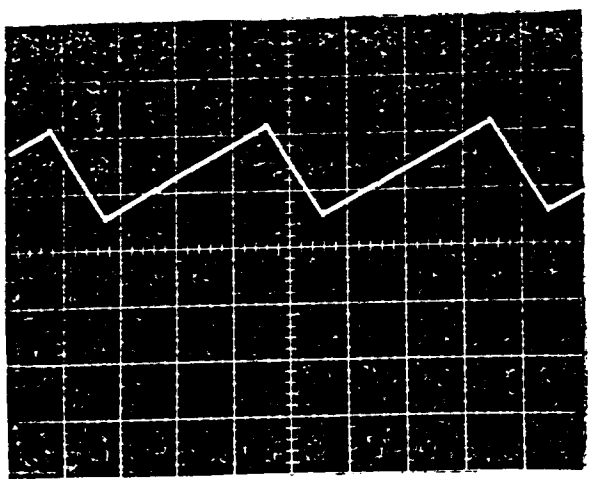
(2) I C 9 0 1 ＃1 6 , 50V , 10μS



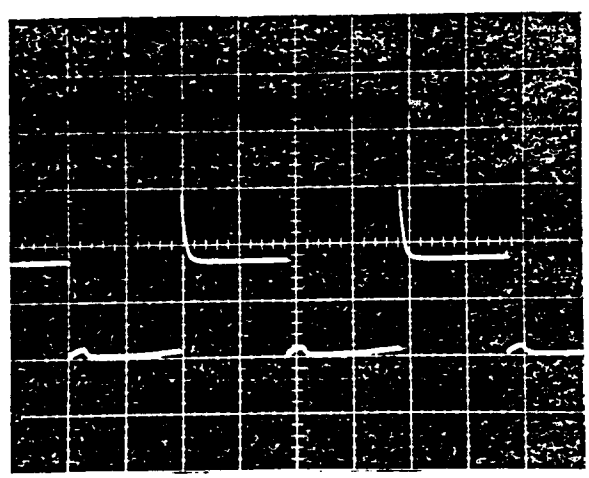
(3) T 9 0 1 ＃7 , 50V, 10μS



(4) I C 5 0 1 ＃3 , 2V, 10μS

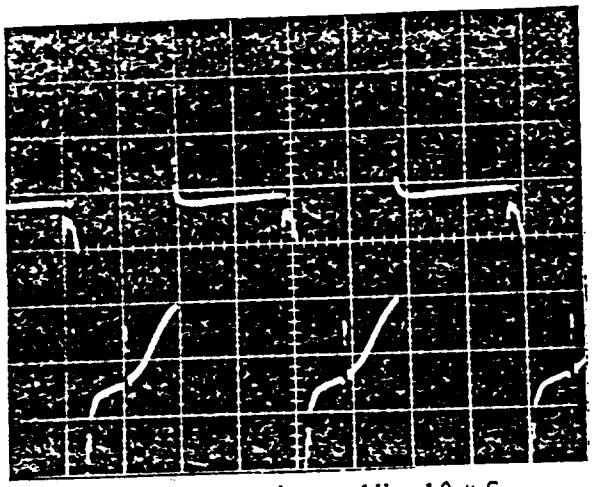


(5) I C 5 0 1 , ＃1 1 , 2V, 10μs

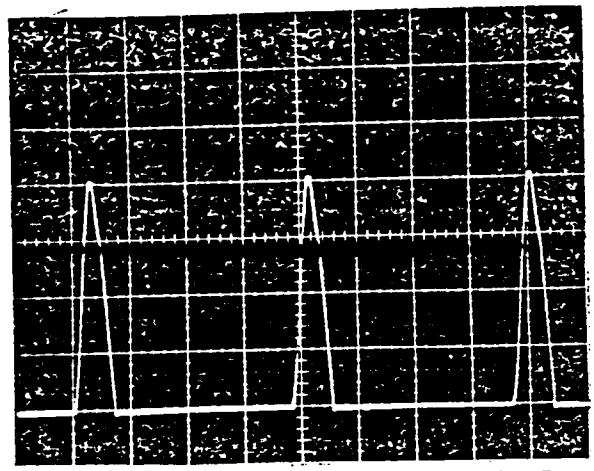


(6) I C 5 0 1 , ＃8 , 10V, 10μS

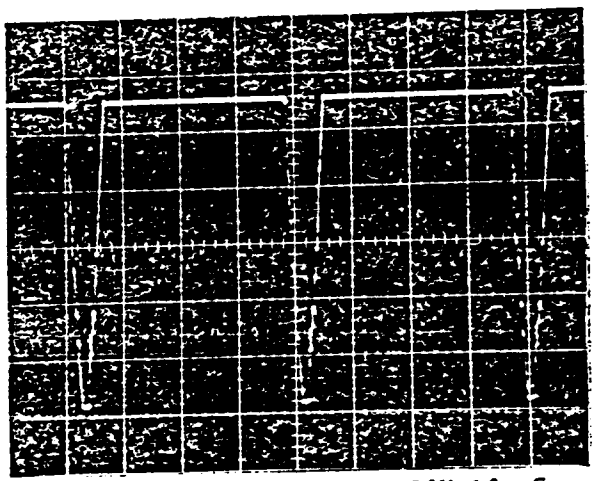
Fig. 4-5 . Waveforms



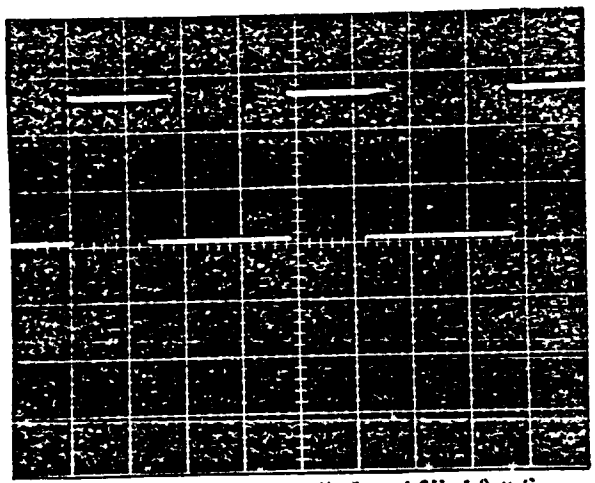
(1) Q 5 0 1 base. 1V, 10μS



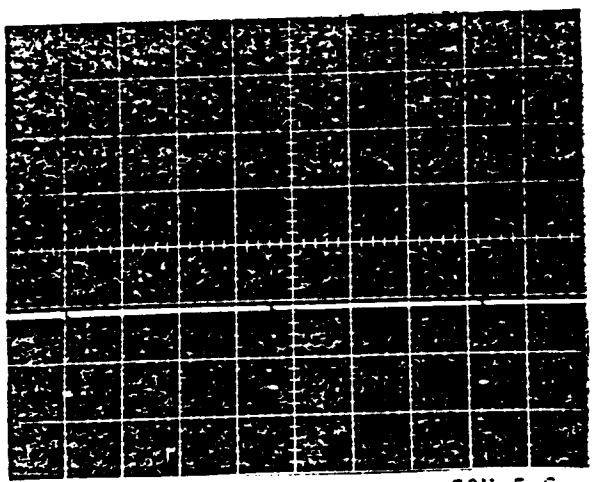
(2) Q 5 0 1 C O L L, 200V. 10μS



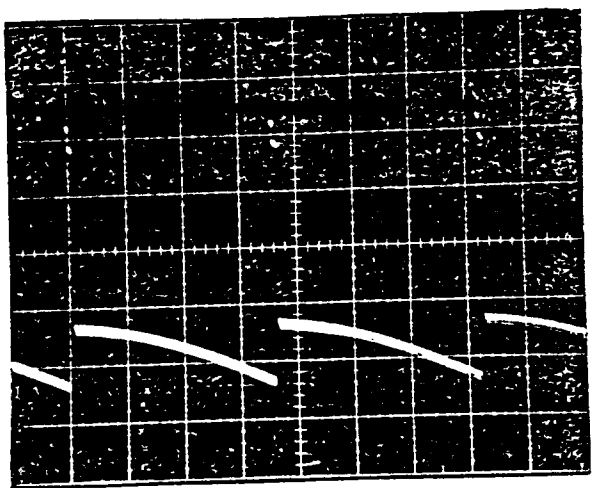
(3) D 5 0 6 cathode. 20V, 10μS



(4) I C 4 5 1, # 5, 10V. 10μS

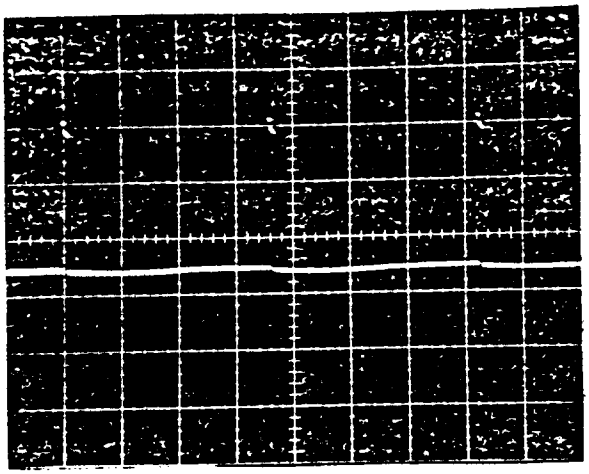


(5) I C 5 0 2, # 1 4, 50V. 5mS

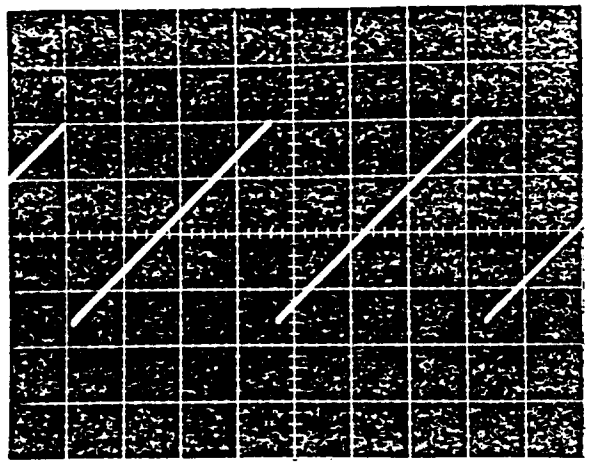


(6) I C 4 0 1, # 1, 10V. 5mS

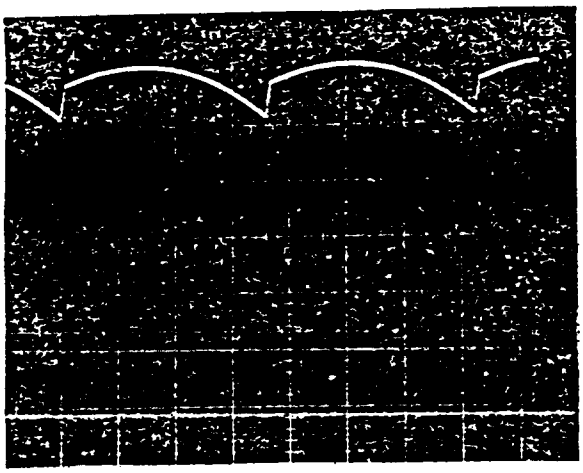
Fig. 4-6. Waveforms



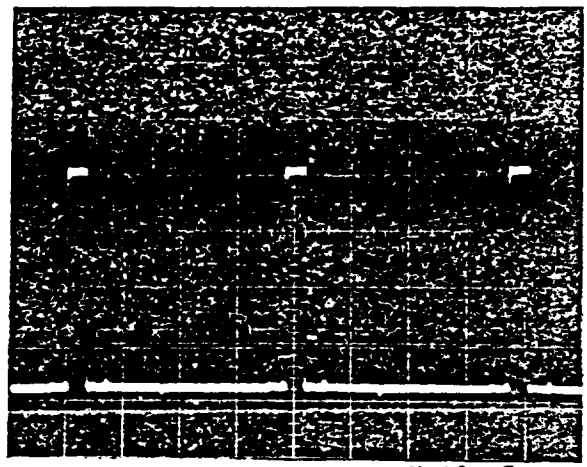
(1) IC401, #2, 10V.5mS



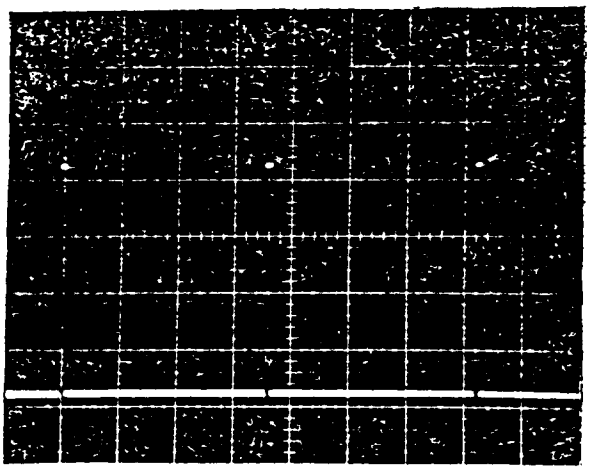
(2) IC401, #3, 1V.5mS



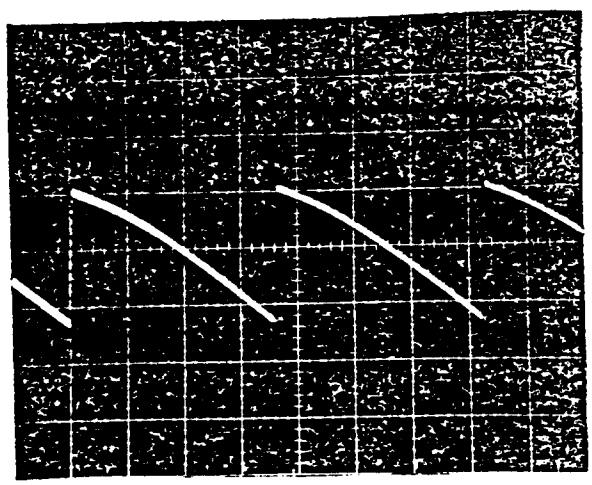
(3) IC402, #5, 2V.5mS



(4) IC402, #9, 1V.10μS



(5) IC402, #8, 1V.5mS



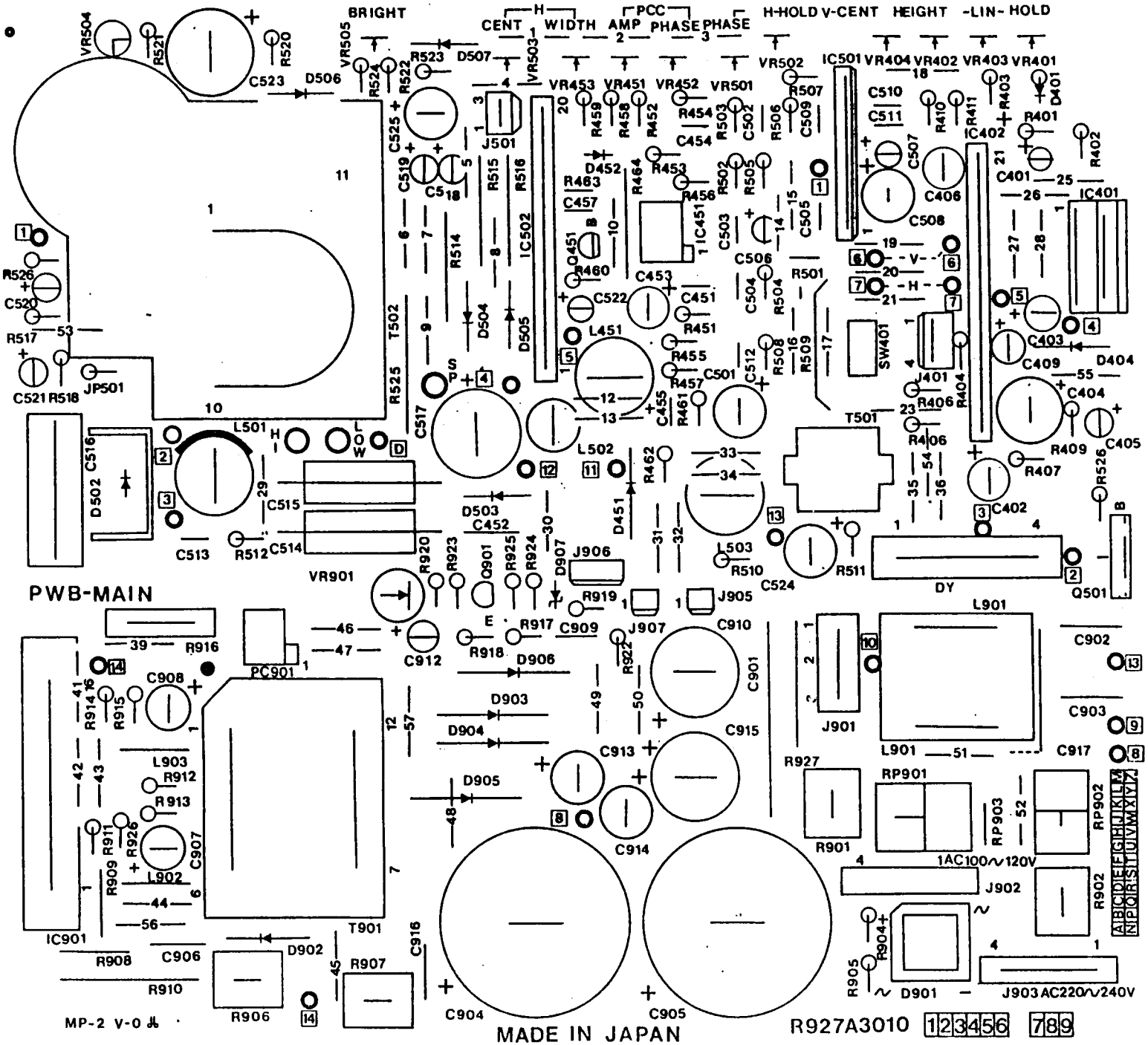
(6) IC402, #3, 0.5V.5mS

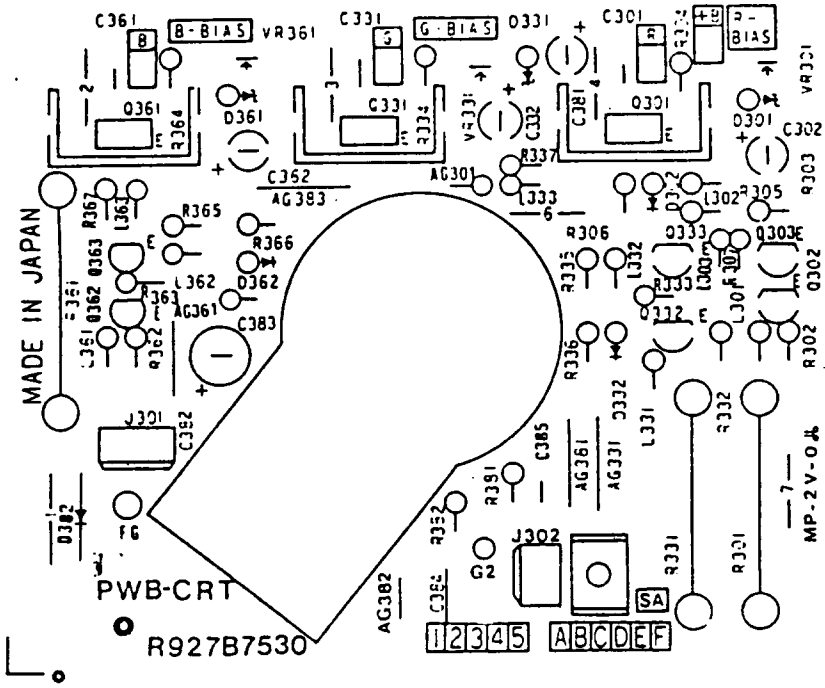
Fig. 4-7. Waveforms

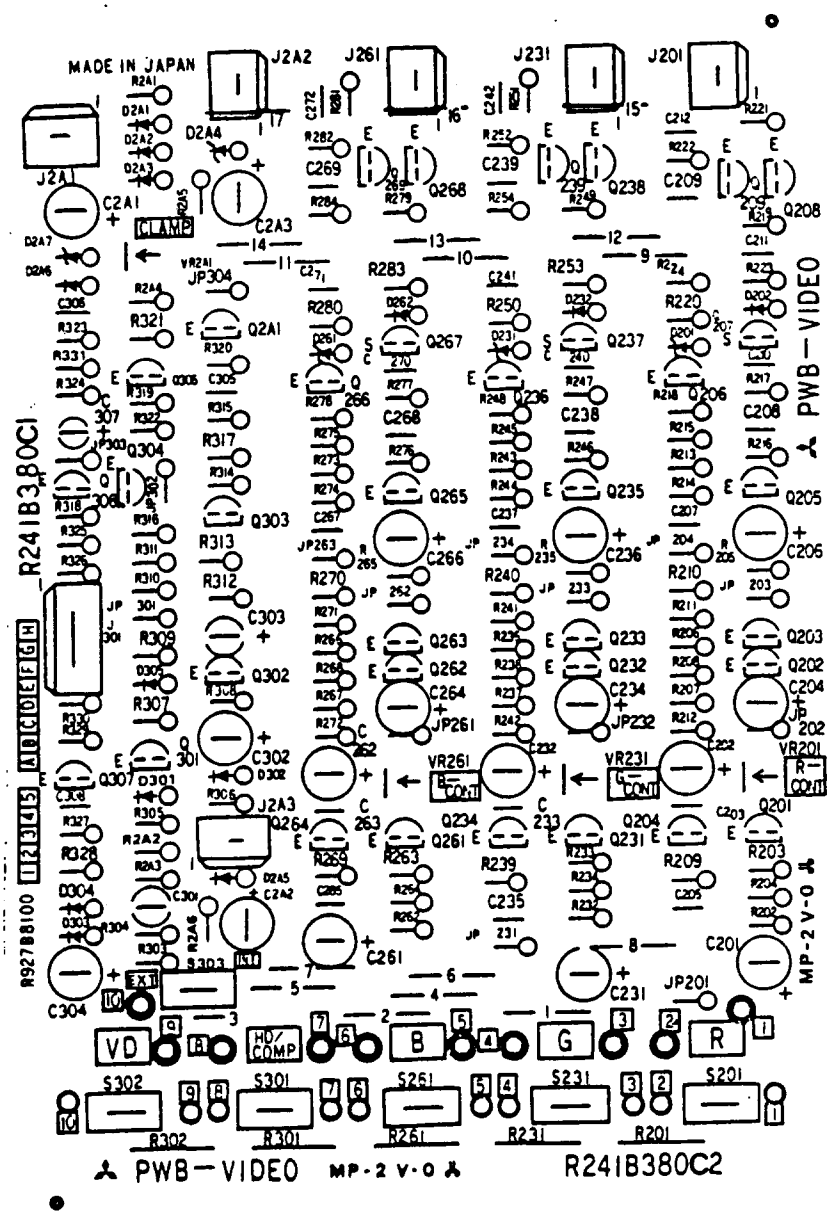
SECTION 5
SCEMATIC DIAGRAMS

MODEL : FHF3500

Fig. 5-1 is schematic diagram of FHF3500. As concerns the model FHF2500/FHF1500, FHF3500T/FHF2500T/FHF1500T and HF3400/HF2400/HF1400, see Table 6-1, Table 6-2 and Table 6-3.


BRIGHT
H
CENT
WIDTH
PCC
AMP
2
PHASE
3
PHASE
H-HOLD
V-CENT
HEIGHT
-LIN-
HOLD
VR504
VR505
VR503
VR453
VR451
VR452
VR501
VR502
IC501
VR404
VR402
VR403
VR401
J501
IC502
IC451
IC402
IC401
T502
T501
L501
L502
L451
L503
L901
L902
L903
T901
SW401
J401
J901
J902
J903
J905
J906
J907
PC901
IC901
VR901
RP901
RP902
RP903
D901
Q451
Q501
Q901
DY
JP501
PWB-MAIN
MP-2 V-0
MADE IN JAPAN
R927A3010
1AC100~120V
AC220~240V


MADE IN JAPAN
B-BIAS
G-BIAS
R-BIAS
VR361
VR331
VR301
J301
J302
PWB-CRT
R927B7530
MP-2V-0
1 2 3 4 5
A B C D E F
SA
G2


MADE IN JAPAN
J2A2
J261
J231
J201
J2A1
CLAMP
JP304
R241B380C1
R92788100
PWB—VIDEO
VD
HD/COMP
B
G
R
S302
S301
S261
S231
S201
R302
R301
R261
R231
R201
PWB—VIDEO MP-2V-0
R241B380C2
MP-2V-0

SECTION 6
PARTS LIST

The following table contains a list of replaceable subassemblies, and Chassis piece parts. In order to expedite delivery of replacement part orders.

Specify: 1. Symbol Number
2. Part Number and Description
3. Quantity

Unless full information is supplies, delay in execution of orders will result.

RESISTOR

MARK	TOLERANCE
J	±5%
K	±10%
M	±20%
F	±1%

CAPACITOR

MARK	TOLERANCE
J	±5%
K	±10%
M	±20%
P	+100% - 0%

MARK	TOLERANCE
Z	±80% -20%
C	±0.25pF
P	±0.5pF
F	±1pF

NOTICE

VR504 (V-DET), Flyback transformer (T502) and other parts marked ⚠ on the schematic diagram and the parts list are critical components and never adjust or replace these components in the field servicing.

Critical components are shown in Table 6-0.

Table 6-0 CRITICAL COMPONENTS LIST

PART NO	PART NAME	DISCRIPTION
-	CRT	AF15A9LB22
T502	TRANS	334P531A1
C516	C-PLASTIC-PP	1200V 0.011 μ F-J
IC401	IC	TDA1670
IC402	IC	HIC-1
IC501	IC	AN5790N
IC502	IC	HIC-2
R520	R-CARBON	1/4W-1.5KΩ-J
R521	R-CARBON	1/4W-2.7KΩ-J
VR504	VR-SF	1/2W B-5KΩ

Table 6-1 DIFFERENCE OF FHF2500/FHF1500 FROM FHF3500

PART NO.	PART NAME	DESCRIPTION	
		FHF2500	FHF1500
C452	C-PLASTIC-PP	630V 4700P-J	630V 8200P-J
C457	C-CERAMIC C-PLASTIC	Same as FHF3500	C-PLASTIC 50V-0.001MF-K
C509	C-PLASTIC	50V 0.0068MF-K	50V 0.0082MF-J
C511	C-POLYESTER	100V 1000P-F	100V 1800P-F
C514	C-M-POLYESTER	Same as FHF3500	200V 1.0MF-K
C515	C-M-POLYESTER	Same as FHF3500	200V 1.0MF-K
C516 ⚠	C-PLASTIC-PP	1200V 0.01MF-J	1200V 0.013MF-J
L451	CHOKE	409D526A1	409D526A1
L501	COIL-LIN	409P508A1	409P531A1
T502	TRANS	334P524-1	334P527-1
R463	R-CARBON	Same as FHF3500	1/4W-150K-J-TP
R464	R-METAL R-COMPOSITION	R-COMPOSITION 1/2W 4.7-J	R-COMPOSITION 1/2W 4.7-J
R504	R-CARBON	1/4W 3.3K-J-TP	1/4W-3.3K-J-TP
R518	R-CARBON	1/4W-120K-TP	1/4W-120K-J-TP

Table 6-2 DIFFERENCE OF FHF-3500T/FHF2500T/FHF1500T FROM FHF3500/FHF2500/FHF1500

PART NO.	PART NAME	DISCRIPTION	
		FHF3500/FHF2500/FHF1500	FHF3500T/FHF2500T/FHF1500T
R406	R-CARBON (TP)	1/2WVS-820-J-TP	1/2WVS-560-J-TP
R928	R-WIRE	3W 1.5	NOT USED
— ⚠	CRT	AF15A9LB22	E2994B22

Table 6-3 DIFFERENCE OF HF3400/HF2400/HF1400 FROM FHF3500

PART NO.	PART NAME	DESCRIPTION		
		HF3400	HF2400	HF1400
C452	C-PLASTIC-PP	630V 1500P-J	630V 4700P-J	630V 8200P-J
C457	C-CERAMIC C-PLASTIC	Same as FHF3500	Same as FHF3500	C-PLASTIC 50V-0.001MF-K
C509	C-PLASTIC	Same as FHF3500	50V 0.0068MF-K	50V 0.0082MF-J
C511	C-POLYESTER	NOT USED	100V 1000P-F	100V 1800P-F
C514	C-M-POLYESTER	Same as FHF3500	Same as FHF3500	200V 1.0MF-K
C515	C-M-POLYESTER	200V 0.22MF-K	Same as FHF3500	200V 1.0MF-K
C516⚠	C-PLASTIC-PP	1200V 0.0082MF-J	1200V 0.01MF-J	1200V 0.013MF-J
L451	CHOKE	Same as FHF3500	409D526A1	409D526A1
L501	COIL-LIN	Same as FHF3500	409P508A1	409P531A1
T502⚠	TRANS	334P525-1	334P524-1	334P527-1
R463	R-CARBON	Same as FHF3500	Same as FHF3500	1/4W-150K-J-TP
R464	R-METAL R-COMPOSITION	Same as FHF3500	R-COMPOSITION 1/2W 4.7-J	R-COMPOSITION 1/2W 4.7-J
R504	R-CARBON	Same as FHF3500	1/4W-3.3K-J-TP	1/4W-3.3K-J-TP
R518	R-CARBON	Same as FHF3500	1/4W-120K-J-TP	1/4W-120K-J-TP

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		...LCO Part No.
01010	C 401	C-TANTAL(TP)	499D224X9-035AE2T2D2 L3502-224KA RKS-00C0001A	1		35V-0.22U-K-TP
01020	C 402	C-ELE	35V 100MF R189D559A9	1		189D559-9
01030	C 403	C-ELE	25V 220MF R189D559A8	1		189D559-8
01040	C 404	C-ELE	16V 2200MF R189D559A7	1		189D559-7
01050	C 405	C-AL(TP)	10TW-TP100MS,SS/ECEA 1AS101A RKS-00C0001A	1		CE04W-10V-100M-M-TP
01060	C 406	C-ELE-BP	CE04D1C100-BP R180P051A3	1		180P051A3
01070	C 451	C-PLASTIC(TP)	AHXV50V473K,J/50F2S- TP473K,J RKS-00C0001A	1		50V-0.047U-K-TP
01080	C 452	C-PP	630V 3300P-J R172P088A4	1		172P088A4
01090	C 453	C-AL(TP)	50TW-TP47MS,SS/ECEA1 HS470A RKS-00C0001A	1		CE04U-50V-47M-M-TP
01100	C 454	C-PLASTIC(TP)	AHXV50V473K,J/50F2S- TP473K,J RKS-00C0001A	1		50V-0.047U-K-TP
01110	C 455	C-POLYESTER	50V 154K R172P012A9	1		172P012-9
01120	C 456			1	W	NOT-USED
01130	C 457	C-CERAMIC	SL50V 120P-J R155P313A8	1		155P313-8
01140	C 501	C-ELE	CE04W 16V 220M-M R181P262A8	1		181P262A8 181P262-8
01150	C 502	C-CERAMIC(TP)	DD05-959B221K500V APRV-4C1009A RKS-00C0001A	1		B500V-220P-K-TP
01160	C 503	C-PLASTIC(TP)	AHXV50V223K,J/50F2S- TP223K,J RKS-00C0001A	1		50V-0.022U-K-TP
01170	C 504	C-PLASTIC(TP)	AHXV50V153K,J/50F2S- TP153K,J RKS-00C0001A	1		50V-0.015U-K-TP
01180	C 505	C-PLASTIC(TP)	AHXV50V333K,J/50F2S- TP333K,J RKS-00C0001A	1		50V-0.033U-K-TP
01190	C 506	C-AL(TP)	50TW-TP4R7MS,SS/ECEA 1HS4R7A RKS-00C0001A	1		CE04U-50V-4.7M-M-TP
01200	C 507	C-AL(TP)	50TW-TP10MS,SS/ECEA1H S010A RKS-00C0001A	1		CE04U-50V-10 M-M-TP

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		ALCO Part No.	
02010	C 508	C-ELE	16V 1000MF R189D559A5	1		189D559-5	
02020	C 509	C-PLASTIC(TP)	ALMXV50V472K,J/50F2S-TP472K,J RKS-00C0001A	1		50V-0.0047M-K-TP	
02030	C 510	C-POLYESTER	100V 182-F R189D545A3	1		189D545-3	
02040	C 511			1	W	NOT-USED	
02050	C 512	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP	
02060	C 513	C-CERAMIC	D500V 2200P-K R142P011B7	1		142P011A7 142P011-7	
02070	C 514	C-M-POLYESTER	200V 0.68MF-K R189D562A2	1		189D562-2	
02080	C 515	C-M-POLYESTER	200V 0.68MF-K R189D562A2	1		189D562-2	
02090	C 516	C-PLASTIC-PP	1200V 0.011 MF-J R189D510A9	1		189D510A9	⚠
02100	C 517	C-ELE	50V 470MF R189D559A1	1		189D559-1	
02110	C 518	C-AL(TP)	50TW-TP4R7MS,SS/ECEA 1HS4R7A RKS-00C0001A	1		CE04W-50V-4,7M-M-TP	
02120	C 519	C-AL(TP)	50TW-TP4R7MS,SS/ECEA 1HS4R7A RKS-00C0001A	1		CE04W-50V-4,7M-M-TP	
02130	C 520	C-AL(TP)	50TW-TP2R2MS,SS/ECEA 1HS2R2A RKS-00C0001A	1		CE04W-50V-2,2M-M-TP	
02140	C 521	C-AL(TP)	50TW-TP0.1MS,SS/ECEA1 HS100A RKS-00C0001A	1		CE04W-50V-0.1M-M-TP	
02150	C 522	C-AL(TP)	50TW-TP2R2MS,SS/ECEA 1HS2R2A RKS-00C0001A	1		CE04W-50V-2,2M-M-TP	
02160	C 523	C-ELECTROLYTIC	* 04W160V47M R180P041A9	1		180P041-9	
02170	C 524	C-ELE	16V 1000MF R189D559A5	1		189D559-5	
02180	C 525	C-ELECTORLYTIC	* 04W160V4,7 R180P041A5	1		180P041-5	
02190	D 401	DIODE(TP)	1S2076ARG (RG=RADIAL TYPE TAPING)	1		1S2076A-TP	
02200	D 402	DIODE	RU-2 LF-B2 R264P196A2	1		264P196-2	

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		ELCO Part No.	
03010	D 451	DIODE	RU4A R274P552A1	1		274P552-1	
03020	D 452	DIODE(TP)	1S2076ARG (RG=RADIAL TYPE TAPING)	1		1S2076A-TP	
03030	D 501			1	W	NOT-USED	
03040	D 502	DIODE	CTU-G2DR(SANKEN) R274P553A1	1		274P553-1	
03050	D 503	DIODE	RU-2 LF-B2 R264P196A2	1		264P196-2	
03060	D 504	DIODE	RU-2 LF-B2 R264P196A2	1		264P196-2	
03070	D 505	DIODE	RU-2 LF-B2 R264P196A2	1		264P196-2	
03080	D 506	DIODE	RU2(SANKEN) (SI, MOLD-PACK)	1		264P196-1 RU2(SANKEN)	
03090	D 507	DIODE	RU-2 LF-B2 R264P196A2	1		264P196-2	
03100	IC 401	NOT-USED		1	W		
03110	IC 402	IC	HIC-1 R277P842C1	1		277P842C1	⚠
03120	IC 451	IC	TDA4950 R277P612A1	1		277P612-1	⚠
03130	IC 501	IC	AN5790N R277P613A1	1		277P613-1	⚠
03140	IC 502	IC	HIC-2 R277P843C1	1		277P843C1	⚠
03150	J 401	CONNECTOR-A	B4P-SHF-1AA R452D079A4	1		452D079A4	
03160	J 501	CONNECTOR-A	B3P-SHF-1AA R452D079A3	1		452D079A3	
03170	L 451	CHOKE	300MA 3.3MH R409D527A2	1		409D527A2	
03180	L 501	COIL-LIN	MLH84 R409P530B1	1		409P530B1	
03190	L 502	COIL-PEAKING	4700 MH-K R325D029A4	1		325D029A4	
03200	L 503	CHOKE	500MA 2.0MH R409D527A1	1		409D527A1	

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		..LCO Part No.	
04010	Q 451	TRANSISTOR	2SC2603-E,F R270P563A3	1		270P563-3	
04020	Q 501	NOT-USED		1	W		
04030	R 401	R-CARBON(TP)	RD25TC04NP5,6K-J/RD2 5VTP5,6K-J RKS-00C0001A	1		1/4W-5,6K-J-TP	
04040	R 402	R-CARBON(TP)	RD25TC04NP5,6K-J/RD2 5VTP5,6K-J RKS-00C0001A	1		1/4W-5.6K-J-TP	
04050	R 403	R-CARBON(TP)	RD25TC04NP220K-J/RD2 5VTP220K-J RKS-00C0001A	1		1/4W-220K-J-TP	
04060	R 404	R-CARBON(TP)	RD25TC04NP820K-J/RD2 5VTP820K-J RKS-00C0001A	1		1/4W-820K-J-TP	
04070	R 405			1	W	NOT-USED	
04080	R 406	R-CARBON(TP)	NAR1/2WRP820-OHMJ/R5 0XT32VJ--- RKS-00C0001A	1		1/2WVS-820-J-TP	
04090	R 407	R-CARBON(TP)	RD25TC04NP120-J/RD25 VTP120-J RKS-00C0001A	1		1/4W-120-J-TP	
04100	R 408	NOT USED		1	W		
04110	R 409	R-CARBON	NAM 1/2WRP1.2-OHMJ/R50 XT32VJ --- RKS-00C0001A	1		1/2WVS-1.2-J-TP	
04120	R 410	R-CARBON(TP)	RD25TC04NP3,9K-J/RD2 5VTP3,9K-J RKS-00C0001A	1		1/4W-3.9K-J-TP	
04130	R 411	R-CARBON(TP)	RD25TC04NP3,9K-J/RD2 5VTP3,9K-J RKS-00C0001A	1		1/4W-3,9K-J-TP	
04140	R 451	R-CARBON(TP)	RD25TC04NP18K-J/RD25 VTP18K-J RKS-00C0001A	1		1/4W-18K-J-TP	
04150	R 452	R-CARBON(TP)	RD25TC04NP4,7K-J/RD2 5VTP4,7K-J RKS-00C0001A	1		1/4W-4,7K-J-TP	
04160	R 453	R-CARBON(TP)	RD25TC04NP27K-J/RD25 VTP27K-J RKS-00C0001A	1		1/4W-27K-J-TP	
04170	R 454	R-CARBON(TP)	RD25TC04NP22K-J/RD25 VTP22K-J RKS-00C0001A	1		1/4W-22K-J-TP	
04180	R 455	R-CARBON(TP)	RD25TC04NP56K-J/RD25 VTP56K-J RKS-00C0001A	1		1/4W-56K-J-TP	
04190	R 456	R-CARBON(TP)	RD25TC04NP10K-J/RD25 VTP10K-J RKS-00C0001A	1		1/4W-10K-J-TP	
04200	R 457	R-CARBON(TP)	RD25TC04NP22K-J/RD25 VTP22K-J RKS-00C0001A	1		1/4W-22K-J-TP	

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		JELCO Part No.	
05010	R 458	R-CARBON(TP)	NAM1/2WRP4,7K-OHMJ/R50XT32VJ--- RKS-00C0001A	1		1/2WVS-4,7K-J-TP	
05020	R 459	R-CARBON(TP)	RD25TC04NP1,0K-J/RD25VTP1,0K-J RKS-00C0001A	1		1/4W-1,0K-J-TP	
05030	R 460	R-CARBON(TP)	RD25TC04NP47K-J/RD25VTP47K-J RKS-00C0001A	1		1/4W-47K-J-TP	
05040	R 461	R-CARBON(TP)	RD25TC04NP10K-J/RD25VTP10K-J RKS-00C0001A	1		1/4W-10K-J-TP	
05050	R 501	R-CARBON(TP)	NAM1/2WRP22-OHMJ/R50XT32VJ--- RKS-00C0001A	1		1/2WVS-22-J-TP	
05060	R 502	R-CARBON(TP)	RD25TC04NP820-J/RD25VTP820-J RKS-00C0001A	1		1/4W-820-J-TP	
05070	R 503	R-CARBON(TP)	NAM1/2WRP10K-OHMJ/R50XT32VJ--- RKS-00C0001A	1		1/2WVS-10K-J-TP	
05080	R 504	R-CARBON(TP)	RD25TC04NP1,5K-J/RD25VTP1,5K-J RKS-00C0001A	1		1/4W-1,5K-J-TP	
05090	R 505	R-CARBON(TP)	RD25TC04NP22K-J/RD25VTP22K-J RKS-00C0001A	1		1/4W-22K-J-TP	
05100	R 506	R-CARBON(TP)	RD25TC04NP27K-J/RD25VTP27K-J RKS-00C0001A	1		1/4W-27K-J-TP	
05110	R 507	R-CARBON(TP)	RD25TC04NP2,7K-J/RD25VTP2,7K-J RKS-00C0001A	1		1/4W-2,7K-J-TP	
05120	R 508	R-CARBON(TP)	NAM1/2WRP68-OHMJ/R50XT32VJ--- RKS-00C0001A	1		1/2WVS-68-J-TP	
05130	R 509	R-METAL	2W 10-J R103D090A1	1		103D090A1	
05140	R 510	R-CARBON(TP)	NAM1/2WRP47-OHMJ/R50XT32VJ--- RKS-00C0001A	1		1/2WVS-47-J-TP	
05150	R 511	R-CARBON	1/2W 1.0-J R109C516A6	1		109C516-6	
05160	R 512	R-CARBON(TP)	NAM1/2WRP390-OHMJ/R50XT32VJ--- RKS-00C0001A	1		1/2WVS-390-J-TP	
05170	R 513	NOT-USED		1	W		
05180	R 514	R-FUSE	1/2W4.7K R109P013-7	1		109P013-7	
05190	R 515	R-FUSE	1/2W 1.2-K R109P013-5	1		109P013-5	
05200	R 516	R-FUSE	1/2W 1.2-K R109P013-5	1		109P013-5	

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		ALCO Part No.		
06010	R 517	R-CARBON(TP)	RD25TC04NP10K-J/RD25 VTP10K-J RKS-00C0001A	1		1/4W-10K-J-TP		
06020	R 518	R-CARBON(TP)	RD25TC04NP220K-J/RD2 5VTP150K-J RKS-00C0001A	1		1/4W-150K-J-TP		
06030	JP 501	R-JUMPER(TP)	RJ25TC04NP0/RD25VTP0 APRV3C1015A RKS-00C0001A	1		1/4W-0-TP		
06040	R 520	R-CARBON(TP)	RD25TC04NP1,5K-J/RD2 5VTP1,5K-J RKS-00C0001A	1		1/4W-1,5K-J-TP	⚠	
06050	R 521	R-CARBON(TP)	RD25TC04NP2,7K-J/RD2 5VTP2,7K-J RKS-00C0001A	1		1/4W-2,7K-J-TP	⚠	
06060	R 522	R-CARBON(TP)	RD25TC04NP100K-J/RD2 5VTP100K-J RKS-00C0001A	1		1/4W-100K-J-TP		
06070	R 523	R-CARBON(TP)	RD25TC04NP330K-J/RD2 5VTP330K-J RKS-00C0001A	1		1/4W-330K-J-TP		
06080	R 524	R-CARBON(TP)	RD25TC04NP47K-J/RD25 VTP47K-J RKS-00C0001A	1		1/4W-47K-J-TP		
06090	R 525	R-METAL	* 2W 1,5K-J R103D092A7	1		103D092A7		
06100	SW 401	SW-SL	NSW0567-30 R431P018A1	1		431P018A1		
06110	T 501	TRANS	H-T-DRIVE R409C538A1	1		409C538A1		
06120	T 502	FBT	TLF70117 R334P531A1	1		334P531A1	⚠	
06130	VR 401	VR-SF	1/10W B-10K R129C518A3	1		129C518-3		
06140	VR 402	VR-SEMIFIXED	1/10W B-200K R129C518A7	1		129C518-7		
06150	VR 403	VR-SEMIFIXED	1/10W B-100K R129C518A6	1		129C518-6		
06160	VR 404	VR-SEMIFIXED	1/10W B-5K R129C518A2	1		129C518-2		
06170	VR 451	VR-SEMIFIXED	1/10W B-50K R129C518A5	1		129C518-5		
06180	VR 452	VR-SEMIFIXED	1/10W B-20K R129C518A4	1		129C518-4		
06190	VR 453	VR-SEMIFIXED	1/10W B-5K R129C518A2	1		129C518-2		
06200	VR 501	VR-SEMIFIXED	1/10W B-50K R129C518A5	1		129C518-5		

(Type/rating)	Q'ty		LCO Part No.		
R129C520A1	1		129C520-1		
R129C518A1	1		129C518-1		
R129C507A8	1		129C507A8	⚠	
K R129C518A6	1		129C518-6		
MN R189D556A1	1		189D556-1		
R189D538A1	1		189D538-1		
R189D538A1	1		189D538-1		
	1		189D531-3		
	1		189D531-3		
-J R172P088A6	1		172P088-6		
R189D559A2	1		189D559-2		
R189D559A2	1		189D559-2		
R154P036B3	1		154P036B3		
1 R189D561A1	1		189D561-1		
	1	W	HOT-USED		
R189D560A1	1		189D560-1		
R189D559A5	1		189D559-5		
R189D559A5	1		189D559-5		
R189D559A6	1		189D559-6		
-K R154P031-6	1		154P031-6		

Item	Ref-Des	Part Name	Desc..ption(Type/rating)	Q'ty		.LCO Part No.	
08010	D 901	DIODE	S4VB40-FORMING R264P200A7	1		264P200A7	
08020	D 902	DIODE	ERD28-06 R274P534A2	1		274P534-2	
08030	D 903	DIODE	ERC2506L1 R274P527A-4	1		274P527-4	
08040	D 904	DIODE	ERC2506L1 R274P527A-4	1		274P527-4	
08050	D 905	DIODE	ERD28-06 R274P534A2	1		274P534-2	
08060	D 906	DIODE	ERD28-06 R274P534A2	1		274P534-2	
08070	D 907	DIODE-ZENER	HZ307B	1			
08080	D 908	NOT-USED		1	W		
08090	IC 901	NOT-USED		1	W		
08100	J 901	CONNECTOR	3PIN R452D544A1	1		452D544-1	
08110	J 902	PIN-BOAD	4P R450D036-4	1		450D036-4	
08120	J 903	PIN-BOAD	4P R450D036-4	1		450D036-4	
08130	J 904			1	W	NOT-USED	
08140	J 905	CONNECTOR-A	B2P-SHF-1AA R452D079A2	1		452D079A2	
08150	J 906	CONNECTOR-A	B4P-SHF-1AA R452D079A4	1		452D079A4	
08160	J 907	CONNECTOR-A	B2P-SHF-1AA R452D079A2	1		452D079A2	
08170	L 901	LINE-FILTER	R499P509A2	1		499P509-2	
08180	L 902	INDUCTOR	4.7M-K R409C526A7	1		409C526-7	
08190	L 903	INDUCTOR	4.7M-K R409C526A7	1		409C526-7	
08200	L 904			1	W	NOT-USED	

Item	Ref-Des	Part Name	Desc..ption(Type/rating)	Q'ty	...LCO Part No.
09010	PC 901	PHOTO-COUPLER	PC-714 R278P504A1	1	278P504-1
09020	Q 901	TR	2SC2229-Y R270P511A2	1	270P511A2
09030	R 901	R-CEMENT-WIRE	5W 1000HM-K R109D519A2	1	109D519-2
09040	R 902	R-CEMENT-WIRE	5W 3300HM-K R109D519A3	1	109D519-3
09050	R 903	THERMISTOR	16D-13 R275P508A1	1	275P508-1
09060	R 904	R-CARBON(TP)	NAM1/2WRP100K-OHMJ/R 50XT32VJ--- RKS-00C0001A	1	1/2WVS-100K-J-TP
09070	R 905	R-CARBON(TP)	NAM1/2WRP100K-OHMJ/R 50XT32VJ--- RKS-00C0001A	1	1/2WVS-100K-J-TP
09080	R 906	R-CEMENT	5W,39KOHM R109D519A5	1	109D519-5
09090	R 907	R-CEMENT	5W 1.5KOHM-K R109D519A7	1	109D519-7
09100	R 908	R-FUSE	1/2W 1.8K R109D531A1	1	109D531-1
09110	R 909	R-FUSE	1/2W 1.8K R109D531A1	1	109D531-1
09120	R 910	R-METAL	2W 100K-J R103D094A9	1	103D094-9
09130	R 911	R-CARBON(TP)	NAM1/2WRP1.0M-OHMJ/R 50XT32VJ--- RKS-00C0001A	1	1/2WVS-1.0M-J-TP
09140	R 912	R-CARBON(TP)	NAM1/2WRP10-OHMJ/R50 XT32VJ--- RKS-00C0001A	1	1/2WVS-10-J-TP
09150	R 913	R-CARBON(TP)	NAM1/2WRP10-OHMJ/R50 XT32VJ--- RKS-00C0001A	1	1/2WVS-10-J-TP
09160	R 914	R-CARBON(TP)	RD25TC04NP2.7K-J/RD2 5VTP2.7K-J RKS-00C0001A	1	1/4W-2.7K-J-TP
09170	R 915	R-CARBON(TP)	RD25TC04NP33K-J/RD25 VTP33K-J RKS-00C0001A	1	1/4W-33K-J-TP
09180	R 916	R-METAL	0.47-OHM 3W R109D517A3	1	109D517-3
09190	R 917	R-CARBON(TP)	NAM1/2WRP33-OHMJ/R50 XT32VJ--- RKS-00C0001A	1	1/2WVS-33-J-TP
09200	R 918	R-CARBON(TP)	NAM1/2WRP33-OHMJ/R50 XT32VJ--- RKS-00C0001A	1	1/2WVS-33-J-TP

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		NEC Part No.		
10010	R 919	R-CARBON(TP)	NAM1/2WRP18K-OHMJ/R50XT32VJ--- RKS-00C0001A	1		1/2WVS-18K-J-TP		
10020	R 920	R-CARBON(TP)	NAM1/2WRP8,2K-OHMJ/R50XT32VJ--- RKS-00C0001A	1		1/2WVS-8,2K-J-TP		
10030	R 921	NOT-USED		1	W			
10040	R 922	R-CARBON(TP)	NAM1/2WRP220-OHMJ/R50XT32VJ--- RKS-00C0001A	1		1/2WVS-220-J-TP		
10050	R 923	R-CARBON(TP)	RD25TC04NP1,0K-J/RD25VTP1,0K-J RKS-00C0001A	1		1/4W-1.0K-J-TP		
10060	R 924	R-CARBON(TP)	RD25TC04NP1,2K-J/RD25VTP3,3K-J RKS-00C0001A	1		1/4W-1.2K-J-TP		
10070	R 925	R-CARBON(TP)	RD25TC04NP220-J/RD25VTP220-J RKS-00C0001A	1		1/4W-220-J-TP		
10080	RP 901	POSISTOR	PTH451B02BG8R0H140 R275P504A1	1		275P504A1		
10090	RP 902	POSISTOR	PTH451B01BG360M270 R275P504A2	1		275P504A2		
10100	T 901	TRANS-POWER	R355P546A1	1		355P546A1		
10110	VR 901	VR-SF	1/2W B-3K R129C035A7	1		129C035-7		
10120	R 462	R-CARBON(TP)	RD25TC04NP27K-J/RD25VTP27K-J RKS-00C0001A	1		1/4W-27K-J-TP		
10130	C 407			1	W	NOT-USED		
10140	C 409	C-AL(TP)	16TW-TP33MS,SS/ECEA1CS330A RKS-00C0001A	1		CE04W-16V-33M-M-TP		
10150	C 917	C-DP	ECU-U 2A104MN R189D556A1	1		189D556-1		
10160	R 463	R-CARBON(TP)	RD25TC04NP560K-J/RD25VTP560K-J RKS-00C0001A	1		1/4W-560K-J-TP		
10170	R 926	R-CARBON(TP)	NAM1/2WRP1,2K-OHMJ/R50XT32VJ--- RKS-00C0001A	1		1/2WVS-1,2K-J-TP		
10180	R 927	R-CARBON	1/2W 390K-J R103P145A6	1		103P145-6		
10190	R 526					NOT USED		
10200	R 464	R-METAL	* 1W 15-J R103D080A3	1		103D080A3		

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		MELCO Part No.		
01010	AG 301	SURGE-PROTECTOR	DSP 301N R252C505A1	1		252C505-1		
01020	AG 331	SURGE-PROTECTOR	DSP 301N R252C505A1	1		252C505-1		
01030	AG 361	SURGE-PROTECTOR	DSP 301N R252C505A1	1		252C505-1		
01040	AG 381	SURGE-PROTECTOR	DSP 301N R252C505A1	1		252C505-1		
01050	AG 382	AIR-GAP	R224D019A1 (MI)224D019A10	1		224D019A1		
01060	AG 383	SURGE-PROTECTOR	DSP 301N R252C505A1	1		252C505-1		
01070	C 301	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP		
01080	C 331	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP		
01090	C 361	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP		
01100	C 302	C-FLE	04W100V2.2M-M R181P268-9	1		181P268A9 181P268-9		
01110	C 332	C-FLE	04W100V2.2M-M R181P268-9	1		181P268A9 181P268-9		
01120	C 362	C-FLE	04W100V2.2M-M R181P268-9	1		181P268A9 181P268-9		
01130	C 381	C-AL(TP)	25TW-TP22MS,SS7ECEA1 ES220A RKS-00C0001A	1		CE04W-25V-22M-M-TP		
01140	C 382	C-C	B500V 0.01M-K R142P012B5	1		142P012A5 142P012-5		
01150	C 383	C-ELE	04W100V100M-M	1		189D559-4		
01160	C 384	C-C	B2K 471-K R154P031A1	1		154P031-1		
01170	D 301	D	MZ-320 R264P193A2	1		264P193A2		
01180	D 331	D	MZ-320 R264P193A2	1		264P193A2		
01190	D 361	D	MZ-320 R264P193A2	1		264P193A2		
01200	D 302	DIODE	RC2(SANKEN) (SI, MOLD-PACK)	1		264P209A1 RC2(SANKEN)		

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty	hELCO Part No.
02010	D 332	DIODE	RC2(SANKEN) (SI, MOLD-PACK)	1	264P209A1 RC2(SANKEN)
02020	D 362	DIODE	RC2(SANKEN) (SI, MOLD-PACK)	1	264P209A1 RC2(SANKEN)
02030	J 301	CONNECTOR-A	04P-SHF-1AA	1	
02040	J 302	CONNECTOR-A	03P-SHF-1AA R452D079A4	1	452D079A4
02050	L 301	INDUCTOR	3.9MH R452D079A3	1	452D079A3
02060	L 331	INDUCTOR	3.9MH R409C526A6	1	409C526-6
02070	L 361	INDUCTOR	3.9MH R409C526A6	1	409C526-6
02080	L 302	INDUCTOR	R409C525A9 R409C526A6	1	409C526-6
02090	L 332	INDUCTOR	R409C525A9	1	409C525-9
02100	L 362	INDUCTOR	R409C525A9	1	409C525-9
02101	L 303	INDUCTOR	R409C526A5 3.3MH	1	409C525-9
02102	L 333	INDUCTOR	R409C526A5 3.3MH	1	409C526-5
02103	L 363	INDUCTOR	R409C526A5 3.3MH	1	409C526-5
02110	Q 301	TR	2SC3502-E,F	1	409C526-5
02120	Q 331	TR	2SC3502-E,F R270P579A6	1	270P579-6
02130	Q 361	TR	2SC3502-E,F R270P579A6	1	270P579-6
02140	Q 302	TR	2SC3467-E,F R270P579A6	1	270P579-6
02150	Q 332	TR	2SC3467-E,F R270P589A6	1	270P589-6
02160	Q 362	TR	2SC3467-E,F R270P589A6	1	270P589-6
02170	Q 303	TR	2SA1370-E,F R270P589A6	1	270P589-6
			R270P588A6	1	270P588-6

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		ALCO Part No.		
02180	Q 333	TR	2SA1370-E,F R270P588A6	1		270P588-6		
02190	Q 363	TR	2SA1370-E,F R270P588A6	1		270P588-6		
02200	R 301	R-METAL	3W 1K-J R103P137A1	1		103P137-1		
03010	R 331	R-METAL	3W 1K-J R103P137A1	1		103P137-1		
03020	R 361	R-METAL	3W 1K-J R103P137A1	1		103P137-1		
03030	R 302	R-CARBON(TP)	NAM1/2WRP100-OHMJ/R5 0XT32VJ--- RKS-00C0001A	1		1/2WVS-100-J-TP		
03040	R 332	R-CARBON(TP)	NAM1/2WRP100-OHMJ/R5 0XT32VJ--- RKS-00C0001A	1		1/2WVS-100-J-TP		
03050	R 362	R-CARBON(TP)	NAM1/2WRP100-OHMJ/R5 0XT32VJ--- RKS-00C0001A	1		1/2WVS-100-J-TP		
03060	R 303	R-CARBON(TP)	NAM1/2WRP100-OHMJ/R5 0XT32VJ--- RKS-00C0001A	1		1/2WVS-100-J-TP		
03070	R 333	R-CARBON(TP)	NAM1/2WRP100-OHMJ/R5 0XT32VJ--- RKS-00C0001A	1		1/2WVS-100-J-TP		
03080	R 363	R-CARBON(TP)	NAM1/2WRP100-OHMJ/R5 0XT32VJ--- RKS-00C0001A	1		1/2WVS-100-J-TP		
03090	R 304	R-CARBON(TP)	NAM1/2WRP12K-OHMJ/R5 0XT32VJ--- RKS-00C0001A	1		1/2WVS-12K-J-TP		
03100	R 334	R-CARBON(TP)	NAM1/2WRP12K-OHMJ/R5 0XT32VJ--- RKS-00C0001A	1		1/2WVS-12K-J-TP		
03110	R 364	R-CARBON(TP)	NAM1/2WRP12K-OHMJ/R5 0XT32VJ--- RKS-00C0001A	1		1/2WVS-12K-J-TP		
03120	R 305	R-CARBON(TP)	RD25TC04NP1.0K-J/RD2 5VTP1.0K-J RKS-00C0001A	1		1/4W-1.0K-J-TP		
03130	R 335	R-CARBON(TP)	RD25TC04NP1.0K-J/RD2 5VTP1.0K-J RKS-00C0001A	1		1/4W-1.0K-J-TP		
03140	R 365	R-CARBON(TP)	RD25TC04NP1.0K-J/RD2 5VTP1.0K-J RKS-00C0001A	1		1/4W-1.0K-J-TP		
03150	R 306	R-COMPOSITION	* 1/2W 680-J 101P681D30	1		101P681D3		
03160	R 336	R-COMPOSITION	* 1/2W 680-J 101P681D30	1		101P681D3		
03170	R 366	R-COMPOSITION	* 1/2W 680-J 101P681D30	1		101P681D3		

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		..CO Part No.		
03171	R 307	R-CARBON(TP)	RD25TC04NP3.9K-J/RD25VTP3.9K-J RKS-00C0001A	1		1/4W-3.9K-J-TP		
03172	R 337	R-CARBON(TP)	RD25TC04NP3.9K-J/RD25VTP3.9K-J RKS-00C0001A	1		1/4W-3.9K-J-TP		
03173	R 367	R-CARBON(TP)	RD25TC04NP3.9K-J/RD25VTP3.9K-J RKS-00C0001A	1		1/4W-3.9K-J-TP		
03180	R 381	R-COMPOSITION	101N001A 1/2 220-J 101P221D30	1		101P221D3		
03190	R 382	R-COMPOSITION	1/2W 5.6M-J R101P565D3	1		101P565D3		
03200	VR 301	VR-SEMIFIXED	1/10W B-50K R129C518A5	1		129C518-5		
04010	VR 331	VR-SEMIFIXED	1/10W B-50K R129C518A5	1		129C518-5		
04020	VR 361	VR-SEMIFIXED	1/10W B-50K R129C518A5	1		129C518-5		
04030	C 385			1	W	NOT-USED		
02021	D 382	DIODE	RU-2 LF-B2 R264P196A1	1		264P196-1		

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		...CO Part No.		
01010	C 201	C-AL(TP)	25TW-TP47MS,SS/ECEA1 ES470A RKS-00C0001A	1		CE04W-25V-47M-M-TP		
01020	C 231	C-AL(TP)	25TW-TP47MS,SS/ECEA1 ES470A RKS-00C0001A	1		CE04W-25V-47M-M-TP		
01030	C 261	C-AL(TP)	25TW-TP47MS,SS/ECEA1 ES470A RKS-00C0001A	1		CE04W-25V-47M-M-TP		
01040	C 202	C-AL(TP)	25TW-TP47MS,SS/ECEA1 ES470A RKS-00C0001A	1		CE04W-25V-47M-M-TP		
01050	C 232	C-AL(TP)	25TW-TP47MS,SS/ECEA1 ES470A RKS-00C0001A	1		CE04W-25V-47M-M-TP		
01060	C 262	C-AL(TP)	25TW-TP47MS,SS/ECEA1 ES470A RKS-00C0001A	1		CE04W-25V-47M-M-TP		
01070	C 203	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP		
01080	C 233	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP		
01090	C 263	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP		
01100	C 204	C-AL(TP)	25TW-TP47MS,SS/ECEA1 ES470A RKS-00C0001A	1		CE04W-25V-47M-M-TP		
01110	C 234	C-AL(TP)	25TW-TP47MS,SS/ECEA1 ES470A RKS-00C0001A	1		CE04W-25V-47M-M-TP		
01120	C 264	C-AL(TP)	25TW-TP47MS,SS/ECEA1 ES470A RKS-00C0001A	1		CE04W-25V-47M-M-TP		
01130	C 205	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP		
01140	C 235	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP		
01150	C 265	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP		
01160	C 206	C-AL(TP)	50TW-TP10MS,SS/ECEA1 HS100A RKS-00C0001A	1		CE04W-50V-10M-M-TP		
01170	C 236	C-AL(TP)	50TW-TP10MS,SS/ECEA1 HS100A RKS-00C0001A	1		CE04W-50V-10M-M-TP		
01180	C 266	C-AL(TP)	50TW-TP10MS,SS/ECEA1 HS100A RKS-00C0001A	1		CE04W-50V-10M-M-TP		
01190	C 207	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP		
01200	C 237	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP		

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		..cLCO Part No.		
02010	C 267	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP		
02020	C 208	C-CERAMIC (TP)	DD104-989B221K50V APRV-4C1010B RKS-00C0001A	1		B50V-220P-K-TP		
02030	C 238	C-CERAMIC (TP)	DD104-989B221K50V APRV-4C1010B RKS-00C0001A	1		B50V-220P-K-TP		
02040	C 268	C-CERAMIC (TP)	DD104-989B221K50V APRV-4C1010B RKS-00C0001A	1		B50V-220P-K-TP		
02050	C 209	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP		
02060	C 239	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP		
02070	C 269	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP		
02080	C 210	C-PLASTIC(TP)	AMXV50V104K,J/50F2S-TP104K,J RKS-00C0001A	1		50V-0.1M-K-TP		
02090	C 240	C-PLASTIC(TP)	AMXV50V104K,J/50F2S-TP104K,J RKS-00C0001A	1		50V-0.1M-K-TP		
02100	C 270	C-PLASTIC(TP)	AMXV50V104K,J/50F2S-TP104K,J RKS-00C0001A	1		50V-0.1M-K-TP		
02110	C 211	C-PLASTIC(TP)	AMXV50V473K,J/50F2S-TP473K,J RKS-00C0001A	1		50V-0.047M-K-TP		
02120	C 241	C-PLASTIC(TP)	AMXV50V473K,J/50F2S-TP473K,J RKS-00C0001A	1		50V-0.047M-K-TP		
02130	C 271	C-PLASTIC(TP)	AMXV50V473K,J/50F2S-TP473K,J RKS-00C0001A	1		50V-0.047M-K-TP		
02140	C 212	C-CERAMIC	SL 50V 150P-J R155P317A3	1		155P317-3		
02150	C 242	C-CERAMIC	SL 50V 150P-J R155P317A3	1		155P317-3		
02160	C 272	C-CERAMIC	SL 50V 150P-J R155P317A3	1		155P317-3		
02170	C 301	C-ELECTROLYTIC-	* 04W 50V 0.47M R180P053A7	1		180P053-7		
02180	C 302	C-AL(TP)	25TW-TP47MS,SS/ECEA1ES470A RKS-00C0001A	1		CE04W-25V-47M-M-TP		
02190	C 303	C-AL(TP)	50TW-TP2R2MS,SS/ECEA1HS2R2A RKS-00C0001A	1		CE04W-50V-2.2M-M-TP		
02200	C 304	C-AL(TP)	25TW-TP47MS,SS/ECEA1ES470A RKS-00C0001A	1		CE04W-25V-47M-M-TP		

Item	Ref-Des	Part Name	Desc. ption(Type/rating)	Q'ty		. .CO Part No.		
03010	C 305	C-CERAMIC(TP)	DD106-999SL181J50V APRV-4C1010B RKS-00C0001A	1		SL50V-180P-J-TP		
03020	C 306	C-PLASTIC(TP)	AMXV50V 682K,J/50F2S- TP682K,J RKS-00C0001A	1		50V-0.0068U-K-TP		
03030	C 307	C-AL(TP)	25TW-TP 47MS,SS/ECEA ES470A RKS-00C0001A	1		CE04W-25V- 47M-M-TP		
03040	C 308	C-CERAMIC(TP)	DD106-999F103Z50V APRV-4C1010B RKS-00C0001A	1		F50V-10000P-Z-TP		
03050	C 2A1	C-FLC	CE04W 16V 220M-M R181P262A8	1		181P262A8 181P262-8		
03060	C 2A2	C-AL(TP)	25TW-TP 22MS,SS/ECEA ES220A RKS-00C0001A	1		CE04W-25V- 22M-M-TP		
03070	C 2A3	C-AL(TP)	25TW-TP47MS,SS/ECEA1 ES470A RKS-00C0001A	1		CE04W-25V-47M-M-TP		
03080	D 201	DIODE	HZ303B R264P193A5	1		264P193-5		
03090	D 231	DIODE	HZ303B R264P193A5	1		264P193-5		
03100	D 261	DIODE	HZ303B R264P193A5	1		264P193-5		
03110	D 202	DIODE(TP)	1S2076ARG (RG=RADIAL TYPE TAPING)	1		1S2076A-TP		
03120	D 232	DIODE(TP)	1S2076ARG (RG=RADIAL TYPE TAPING)	1		1S2076A-TP		
03130	D 262	DIODE(TP)	1S2076ARG (RG=RADIAL TYPE TAPING)	1		1S2076A-TP		
03140	D 301	DIODE(TP)	1S2076ARG (RG=RADIAL TYPE TAPING)	1		1S2076A-TP		
03150	D 302	DIODE(TP)	1S2076ARG (RG=RADIAL TYPE TAPING)	1		1S2076A-TP		
03160	D 303	DIODE(TP)	1S2076ARG (RG=RADIAL TYPE TAPING)	1		1S2076A-TP		
03170	D 304	DIODE(TP)	1S2076ARG (RG=RADIAL TYPE TAPING)	1		1S2076A-TP		
03180	D 305	DIODE	NOT-USED	1				
03190	D 2A1	DIODE(TP)	1S2076ARG (RG=RADIAL TYPE TAPING)	1		1S2076A-TP		
03200	D 2A2	DIODE(TP)	1S2076ARG (RG=RADIAL TYPE TAPING)	1		1S2076A-TP		

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		..CO Part No.		
04010	D 2A3	DIODE(TP)	1S2076ARG (RG=RADIAL TYPE TAPING)	1		1S2076A-TP		
04020	D 2A4	DIODE-ZENER	MZ308-B (SI, GLASS-PACK)	1		264P221-2 MZ308-B		
04030	D 2A5	DIODE(TP)	1S2076ARG (RG=RADIAL TYPE TAPING)	1		1S2076A-TP		
04040	D 2A6	DIODE(TP)	1S2076ARG (RG=RADIAL TYPE TAPING)	1		1S2076A-TP		
04050	D 2A7	DIODE-ZENER	MZ305-B (SI, GLASS-PACK)	1		264P193-3 MZ305-B		
04060	JP 201	R-JUMPER(TP)	RJ25TC04NP0/RD25VTP0 APRV3C1015A RKS-00C0001A	1		1/4W-0-TP		
04070	JP 202	R-JUMPER(TP)	RJ25TC04NP0/RD25VTP0 APRV3C1015A RKS-00C0001A	1		1/4W-0-TP		
04080	JP 203	R-JUMPER(TP)	RJ25TC04NP0/RD25VTP0 APRV3C1015A RKS-00C0001A	1		1/4W-0-TP		
04090	JP 204	R-JUMPER(TP)	RJ25TC04NP0/RD25VTP0 APRV3C1015A RKS-00C0001A	1		1/4W-0-TP		
04100	JP 231	R-JUMPER(TP)	RJ25TC04NP0/RD25VTP0 APRV3C1015A RKS-00C0001A	1		1/4W-0-TP		
04110	JP 232	R-JUMPER(TP)	RJ25TC04NP0/RD25VTP0 APRV3C1015A RKS-00C0001A	1		1/4W-0-TP		
04120	JP 233	R-JUMPER(TP)	RJ25TC04NP0/RD25VTP0 APRV3C1015A RKS-00C0001A	1		1/4W-0-TP		
04130	JP 234	R-JUMPER(TP)	RJ25TC04NP0/RD25VTP0 APRV3C1015A RKS-00C0001A	1		1/4W-0-TP		
04140	JP 261	R-JUMPER(TP)	RJ25TC04NP0/RD25VTP0 APRV3C1015A RKS-00C0001A	1		1/4W-0-TP		
04150	JP 262	R-JUMPER(TP)	RJ25TC04NP0/RD25VTP0 APRV3C1015A RKS-00C0001A	1		1/4W-0-TP		
04160	JP 263	R-JUMPER(TP)	RJ25TC04NP0/RD25VTP0 APRV3C1015A RKS-00C0001A	1		1/4W-0-TP		
04170	JP 301	R-JUMPER(TP)	RJ25TC04NP0/RD25VTP0 APRV3C1015A RKS-00C0001A	1		1/4W-0-TP		
04180	JP 302	R-JUMPER(TP)	RJ25TC04NP0/RD25VTP0 APRV3C1015A RKS-00C0001A	1		1/4W-0-TP		
04190	JP 303	R-JUMPER(TP)	RJ25TC04NP0/RD25VTP0 APRV3C1015A RKS-00C0001A	1		1/4W-0-TP		
04200	JP 304	R-JUMPER(TP)	RJ25TC04NP0/RD25VTP0 APRV3C1015A RKS-00C0001A	1		1/4W-0-TP		

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		..LCO Part No.		
05010	J 201	CONNECTOR-A	B2P-SHF-1AA R452D079A2	1		452D079A2		
05020	J 231	CONNECTOR-A	B2P-SHF-1AA R452D079A2	1		452D079A2		
05030	J 261	CONNECTOR-A	B2P-SHF-1AA R452D079A2	1		452D079A2		
05040	J 2A1	CONNECTOR-A	B2P-SHF-1AA R452D079A2	1		452D079A2		
05050	J 2A2	CONNECTOR-A	B2P-SHF-1AA R452D079A2	1		452D079A2		
05060	J 2A3	CONNECTOR-A	B2P-SHF-1AA R452D079A2	1		452D079A2		
05070	J 301	CONNECTOR-A	B4P-SHF-1AA R452D079A4	1		452D079A4		
05080	Q 201	TR	2SC2347 R270P523A1	1		270P523-1		
05090	Q 231	TR	2SC2347 R270P523A1	1		270P523-1		
05100	Q 261	TR	2SC2347 R270P523A1	1		270P523-1		
05110	Q 202	TR	2SC2347 R270P523A1	1		270P523-1		
05120	Q 232	TR	2SC2347 R270P523A1	1		270P523-1		
05130	Q 262	TR	2SC2347 R270P523A1	1		270P523-1		
05140	Q 203	TR	2SC2347 R270P523A1	1		270P523-1		
05150	Q 233	TR	2SC2347 R270P523A1	1		270P523-1		
05160	Q 263	TR	2SC2347 R270P523A1	1		270P523-1		
05170	Q 204	TRANSISTOR	2SC2347 R270P523A1	1		270P523-1		
05180	Q 234	TRANSISTOR	2SC2347 R270P523A1	1		270P523-1		
05190	Q 264	TRANSISTOR	2SC2347 R270P523A1	1		270P523-1		
05200	Q 205	TR	2SC2347 R270P523A1	1		270P523-1		

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		...CO Part No.		
05010	J 201	CONNECTOR-A	B2P-SHF-1AA R452D079A2	1		452D079A2		
05020	J 231	CONNECTOR-A	B2P-SHF-1AA R452D079A2	1		452D079A2		
05030	J 261	CONNECTOR-A	B2P-SHF-1AA R452D079A2	1		452D079A2		
05040	J 2A1	CONNECTOR-A	B2P-SHF-1AA R452D079A2	1		452D079A2		
05050	J 2A2	CONNECTOR-A	B2P-SHF-1AA R452D079A2	1		452D079A2		
05060	J 2A3	CONNECTOR-A	B2P-SHF-1AA R452D079A2	1		452D079A2		
05070	J 301	CONNECTOR-A	B4P-SHF-1AA R452D079A4	1		452D079A4		
05080	Q 201	TR	2SC2347 R270P523A1	1		270P523-1		
05090	Q 231	TR	2SC2347 R270P523A1	1		270P523-1		
05100	Q 261	TR	2SC2347 R270P523A1	1		270P523-1		
05110	Q 202	TR	2SC2347 R270P523A1	1		270P523-1		
05120	Q 232	TR	2SC2347 R270P523A1	1		270P523-1		
05130	Q 262	TR	2SC2347 R270P523A1	1		270P523-1		
05140	Q 203	TR	2SC2347 R270P523A1	1		270P523-1		
05150	Q 233	TR	2SC2347 R270P523A1	1		270P523-1		
05160	Q 263	TR	2SC2347 R270P523A1	1		270P523-1		
05170	Q 204	TRANSISTOR	2SC2347 R270P523A1	1		270P523-1		
05180	Q 234	TRANSISTOR	2SC2347 R270P523A1	1		270P523-1		
05190	Q 264	TRANSISTOR	2SC2347 R270P523A1	1		270P523-1		
05200	Q 205	TR	2SC2347 R270P523A1	1		270P523-1		

Item	Ref-Des	Part Name	Desc..ption(Type/rating)	Q'ty		..LCO Part No.		
06010	Q 225	TR	2SC2347 R270P523A1	1		270P523-1		
06020	Q 265	TR	2SC2347 R270P523A1	1		270P523-1		
06030	Q 206	TR	2SC2347 R270P523A1	1		270P523-1		
06040	Q 236	TR	2SC2347 R270P523A1	1		270P523-1		
06050	Q 266	TR	2SC2347 R270P523A1	1		270P523-1		
06060	Q 207	FET	2SK381-C,D R270P568A2	1		270P568-2		
06070	Q 237	FET	2SK381-C,D R270P568A2	1		270P568-2		
06080	Q 267	FET	2SK381-C,D R270P568A2	1		270P568-2		
06090	Q 208	TR	2SA781-K R270P524A1	1		270P524-1		
06100	Q 238	TR	2SA781-K R270P524A1	1		270P524-1		
06110	Q 268	TR	2SA781-K R270P524A1	1		270P524-1		
06120	Q 209	TR	2SA1487 R270P600A1	1		270P600-1		
06130	Q 239	TR	2SA1487 R270P600A1	1		270P600-1		
06140	Q 269	TR	2SA1487 R270P600A1	1		270P600-1		
06150	Q 301	TR	2SC2347 R270P523A1	1		270P523-1		
06160	Q 302	TR	2SA781-K R270P524A1	1		270P524-1		
06170	Q 303	TR	2SA781-K R270P524A1	1		270P524-1		
06180	Q 304	TR	2SC2347 R270P523A1	1		270P523-1		
06190	Q 305	TR	2SA781-K R270P524A1	1		270P524-1		
06200	Q 306	TR	2SC2347 R270P523A1	1		270P523-1		

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		ALCO Part No.		
07010	Q 307	TR	2SC2347 R270P523A1	1		270P523-1		
07020	Q 2A1	TR	2SC2347 R270P523A1	1		270P523-1		
07030	R 201	R-C-25	1/4W 75-J R103P319A9	1		103P319A9 103P319-9		
07040	R 231	R-C-25	1/4W 75-J R103P319A9	1		103P319A9 103P319-9		
07050	R 261	R-C-25	1/4W 75-J R103P319A9	1		103P319A9 103P319-9		
07060	R 202	R-CARBON(TP)	RD25TC04NP100-J/RD25 VTP100-J RKS-00C0001A	1		1/4W-100-J-TP		
07070	R 232	R-CARBON(TP)	RD25TC04NP100-J/RD25 VTP100-J RKS-00C0001A	1		1/4W-100-J-TP		
07080	R 262	R-CARBON(TP)	RD25TC04NP100-J/RD25 VTP100-J RKS-00C0001A	1		1/4W-100-J-TP		
07090	R 203	R-CARBON(TP)	RD25TC04NP47K-J/RD25 VTP47K-J RKS-00C0001A	1		1/4W-47K-J-TP		
07100	R 233	R-CARBON(TP)	RD25TC04NP47K-J/RD25 VTP47K-J RKS-00C0001A	1		1/4W-47K-J-TP		
07110	R 263	R-CARBON(TP)	RD25TC04NP47K-J/RD25 VTP47K-J RKS-00C0001A	1		1/4W-47K-J-TP		
07120	R 204	R-CARBON(TP)	RD25TC04NP22K-J/RD25 VTP22K-J RKS-00C0001A	1		1/4W-22K-J-TP		
07130	R 234	R-CARBON(TP)	RD25TC04NP22K-J/RD25 VTP22K-J RKS-00C0001A	1		1/4W-22K-J-TP		
07140	R 264	R-CARBON(TP)	RD25TC04NP22K-J/RD25 VTP22K-J RKS-00C0001A	1		1/4W-22K-J-TP		
07150	R 205	R-CARBON(TP)	RD25TC04NP220-J/RD25 VTP220-J RKS-00C0001A	1		1/4W-220-J-TP		
07160	R 235	R-CARBON(TP)	RD25TC04NP220-J/RD25 VTP220-J RKS-00C0001A	1		1/4W-220-J-TP		
07170	R 265	R-CARBON(TP)	RD25TC04NP220-J/RD25 VTP220-J RKS-00C0001A	1		1/4W-220-J-TP		
07180	R 206	R-CARBON(TP)	RD25TC04NP820-J/RD25 VTP820-J RKS-00C0001A	1		1/4W-820-J-TP		
07190	R 236	R-CARBON(TP)	RD25TC04NP820-J/RD25 VTP820-J RKS-00C0001A	1		1/4W-820-J-TP		
07200	R 266	R-CARBON(TP)	RD25TC04NP820-J/RD25 VTP820-J RKS-00C0001A	1		1/4W-820-J-TP		

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		..LCO Part No.		
08010	R 207	R-CARBON-25	1/4W 4.7-J R103P328A8	1		103P328-8		
08020	R 237	R-CARBON-25	1/4W 4.7-J R103P328A8	1		103P328-8		
08030	R 267	R-CARBON-25	1/4W 4.7-J R103P328A8	1		103P328-8		
08040	R 208	R-CARBON-25	1/4W 4.7-J R103P328A8	1		103P328-8		
08050	R 238	R-CARBON-25	1/4W 4.7-J R103P328A8	1		103P328-8		
08060	R 268	R-CARBON-25	1/4W 4.7-J R103P328A8	1		103P328-8		
08070	R 209	R-CARBON(TP)	RD25TC04NP100-J/RD25 VTP100-J RKS-00C0001A	1		1/4W-100-J-TP		
08080	R 239	R-CARBON(TP)	RD25TC04NP100-J/RD25 VTP100-J RKS-00C0001A	1		1/4W-100-J-TP		
08090	R 269	R-CARBON(TP)	RD25TC04NP100-J/RD25 VTP100-J RKS-00C0001A	1		1/4W-100-J-TP		
08100	R 210	R-CARBON(TP)	RD25TC04NP10K-J/RD25 VTP10K-J RKS-00C0001A	1		1/4W-10K-J-TP		
08110	R 240	R-CARBON(TP)	RD25TC04NP10K-J/RD25 VTP10K-J RKS-00C0001A	1		1/4W-10K-J-TP		
08120	R 270	R-CARBON(TP)	RD25TC04NP10K-J/RD25 VTP10K-J RKS-00C0001A	1		1/4W-10K-J-TP		
08130	R 211	R-CARBON(TP)	RD25TC04NP6,8K-J/RD2 5VTP6,8K-J RKS-00C0001A	1		1/4W-6.8K-J-TP		
08140	R 241	R-CARBON(TP)	RD25TC04NP6.8K-J/RD2 5VTP6.8K-J RKS-00C0001A	1		1/4W-6.8K-J-TP		
08150	R 271	R-CARBON(TP)	RD25TC04NP6,8K-J/RD2 5VTP6.8K-J RKS-00C0001A	1		1/4W-6.8K-J-TP		
08160	R 212	R-CARBON(TP)	RD25TC04NP820-J/RD25 VTP820-J RKS-00C0001A	1		1/4W-820-J-TP		
08170	R 242	R-CARBON(TP)	RD25TC04NP820-J/RD25 VTP820-J RKS-00C0001A	1		1/4W-820-J-TP		
08180	R 272	R-CARBON(TP)	RD25TC04NP820-J/RD25 VTP820-J RKS-00C0001A	1		1/4W-820-J-TP		
08190	R 213	R-CARBON(TP)	RD25TC04NP18K-J/RD25 VTP18K-J RKS-00C0001A	1		1/4W-18K-J-TP		
08200	R 243	R-CARBON(TP)	RD25TC04NP18K-J/RD25 VTP18K-J RKS-00C0001A	1		1/4W-18K-J-TP		

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		JELCO Part No.		
09010	R 273	R-CARBON(TP)	RD25TC04NP18K-J/RD25 VTP18K-J RKS-00C0001A	1		1/4W-18K-J-TP		
09020	R 214	R-CARBON(TP)	RD25TC04NP3.9K-J/RD2 5VTP3.9K-J RKS-00C0001A	1		1/4W-3.9K-J-TP		
09030	R 244	R-CARBON(TP)	RD25TC04NP3.9K-J/RD2 5VTP3.9K-J RKS-00C0001A	1		1/4W-3.9K-J-TP		
09040	R 274	R-CARBON(TP)	RD25TC04NP3.9K-J/RD2 5VTP3.9K-J RKS-00C0001A	1		1/4W-3.9K-J-TP		
09050	R 215	R-CARBON(TP)	RD25TC04NP330-J/RD25 VTP330-J RKS-00C0001A	1		1/4W-330-J-TP		
09060	R 245	R-CARBON(TP)	RD25TC04NP330-J/RD25 VTP330-J RKS-00C0001A	1		1/4W-330-J-TP		
09070	R 275	R-CARBON(TP)	RD25TC04NP330-J/RD25 VTP330-J RKS-00C0001A	1		1/4W-330-J-TP		
09080	R 216	R-CARBON(TP)	RD25TC04NP 56-J/RD25 VTP 56 -J RKS-00C0001A	1		1/4W-330-J-TP		
09090	R 246	R-CARBON(TP)	RD25TC04NP 56 -J/RD25 VTP 56 -J RKS-00C0001A	1		1/4W- 56 -J-TP		
09100	R 276	R-CARBON(TP)	RD25TC04NP 56 -J/RD25 VTP 56 -J RKS-00C0001A	1		1/4W- 56 -J-TP		
09110	R 217	R-CARBON(TP)	RD25TC04NP47-J/RD25V TP47-J RKS-00C0001A	1		1/4W- 56 -J-TP		
09120	R 247	R-CARBON(TP)	RD25TC04NP68-J/RD25V TP68-J RKS-00C0001A	1		1/4W-47-J-TP		
09130	R 277	R-CARBON(TP)	RD25TC04NP47-J/RD25V TP47-J RKS-00C0001A	1		1/4W-68-J-TP		
09140	R 218	R-CARBON(TP)	RD25TC04NP56-J/RD25V TP56-J RKS-00C0001A	1		1/4W-47-J-TP		
09150	R 248	R-CARBON(TP)	RD25TC04NP56-J/RD25V TP56-J RKS-00C0001A	1		1/4W-56-J-TP		
09160	R 278	R-CARBON(TP)	RD25TC04NP56-J/RD25V TP56-J RKS-00C0001A	1		1/4W-56-J-TP		
09170	R 219	R-CARBON(TP)	RD25TC04NP68-J/RD25V TP68-J RKS-00C0001A	1		1/4W-56-J-TP		
09180	R 249	R-CARBON(TP)	RD25TC04NP68-J/RD25V TP68-J RKS-00C0001A	1		1/4W-68-J-TP		
09190	R 279	R-CARBON(TP)	RD25TC04NP68-J/RD25V TP68-J RKS-00C0001A	1		1/4W-68-J-TP		
09200	R 220	R-CARBON(TP)	RD25TC04NP680-J/RD25 VTP680-J RKS-00C0001A	1		1/4W-68-J-TP		
						1/4W-680-J-TP		

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		ELCO Part No.		
10010	R 250	R-CARBON(TP)	RD25TC04NP680-J/RD25 VTP680-J RKS-00C0001A	1		1/4W-680-J-TP		
10020	R 280	R-CARBON(TP)	RD25TC04NP680-J/RD25 VTP680-J RKS-00C0001A	1		1/4W-680-J-TP		
10030	R 221	R-CARBON(TP)	RD25TC04NP56-J/RD25V TP56-J RKS-00C0001A	1		1/4W-56-J-TP		
10040	R 251	R-CARBON(TP)	RD25TC04NP56-J/RD25V TP56-J RKS-00C0001A	1		1/4W-56-J-TP		
10050	R 281	R-CARBON(TP)	RD25TC04NP56-J/RD25V TP56-J RKS-00C0001A	1		1/4W-56-J-TP		
10060	R 222	R-CARBON(TP)	RD25TC04NP82-J/RD25V TP82-J RKS-00C0001A	1		1/4W-82-J-TP		
10070	R 252	R-CARBON(TP)	RD25TC04NP82-J/RD25V TP82-J RKS-00C0001A	1		1/4W-82-J-TP		
10080	R 282	R-CARBON(TP)	RD25TC04NP82-J/RD25V TP82-J RKS-00C0001A	1		1/4W-82-J-TP		
10090	R 223	R-CARBON(TP)	RD25TC04NP100K-J/RD2 5VTP100K-J RKS-00C0001A	1		1/4W-100K-J-TP		
10100	R 253	R-CARBON(TP)	RD25TC04NP100K-J/RD2 5VTP100K-J RKS-00C0001A	1		1/4W-100K-J-TP		
10110	R 283	R-CARBON(TP)	RD25TC04NP100K-J/RD2 5VTP100K-J RKS-00C0001A	1		1/4W-100K-J-TP		
10120	R 224	R-CARBON(TP)	RD25TC04NP39-J/RD25V TP39-J RKS-00C0001A	1		1/4W-39-J-TP		
10130	R 254	R-CARBON(TP)	RD25TC04NP39-J/RD25V TP39-J RKS-00C0001A	1		1/4W-39-J-TP		
10140	R 284	R-CARBON(TP)	RD25TC04NP39-J/RD25V TP39-J RKS-00C0001A	1		1/4W-39-J-TP		
10150	R 2A1	R-CARBON(TP)	RD25TC04NP470-J/RD25 VTP470-J RKS-00C0001A	1		1/4W-470-J-TP		
10160	R 2A2	R-CARBON(TP)	RD25TC04NP6,8K-J/RD2 5VTP6,8K-J RKS-00C0001A	1		1/4W-6,8K-J-TP		
10170	R 2A3	R-CARBON(TP)	RD25TC04NP330-J/RD25 VTP330-J RKS-00C0001A	1		1/4W-330-J-TP		
10180	R 2A4	R-CARBON(TP)	RD25TC04NP1,0K-J/RD2 5VTP1,0K-J RKS-00C0001A	1		1/4W-1,0K-J-TP		
10190	R 2A5	R-CARBON(TP)	RD25TC04NP4,7K-J/RD2 5VTP4,7K-J RKS-00C0001A	1		1/4W-4,7K-J-TP		
10200	R 301	R-C-25	1/4W 75-J R103P319A9	1		103P319A9 103P319-9		

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty	LCO Part No.
11010	R 302	R-C-25	1/4R 75-J R103P319A9	1	103P319A9 103P319-9
11020	R 303	R-CARBON(TP)	RD25TC04NP680-J/RD25 VTP680-J RKS-00C0001A	1	1/4W-680-J-TP
11030	R 304	R-CARBON(TP)	RD25TC04NP330-J/RD25 VTP330-J RKS-00C0001A	1	1/4W-330-J-TP
11040	R 305	R-CARBON(TP)	RD25TC04NP4.7K-J/RD2 5VTP4.7K-J RKS-00C0001A	1	1/4W-4.7K-J-TP
11050	R 306	R-CARBON(TP)	RD25TC04NP680-J/RD25 VTP680-J RKS-00C0001A	1	1/4W-680-J-TP
11060	R 307	R-CARBON(TP)	RD25TC04NP4.7K-J/RD2 5VTP4.7K-J RKS-00C0001A	1	1/4W-4.7K-J-TP
11070	R 308	R-CARBON(TP)	RD25TC04NP180-J/RD25 VTP180-J RKS-00C0001A	1	1/4W-180-J-TP
11080	R 309	R-CARBON(TP)	RD25TC04NP680-J/RD25 VTP680-J RKS-00C0001A	1	1/4W-680-J-TP
11090	R 310	R-CARBON(TP)	RD25TC04NP330-J/RD25 VTP330-J RKS-00C0001A	1	1/4W-330-J-TP
11100	R 311	R-CARBON(TP)	RD25TC04NP10K-J/RD25 VTP10K-J RKS-00C0001A	1	1/4W-10K-J-TP
11110	R 312	R-CARBON(TP)	RD25TC04NP560K-J/RD2 5VTP560K-J RKS-00C0001A	1	1/4W-560K-J-TP
11120	R 313	R-CARBON(TP)	RD25TC04NP100-J/RD25 VTP100-J RKS-00C0001A	1	1/4W-100-J-TP
11130	R 314	R-CARBON(TP)	RD25TC04NP6.8K-J/RD2 5VTP6.8K-J RKS-00C0001A	1	1/4W-6.8K-J-TP
11140	R 315	R-CARBON(TP)	RD25TC04NP6.8K-J/RD2 5VTP6.8K-J RKS-00C0001A	1	1/4W-6.8K-J-TP
11150	R 316	R-CARBON(TP)	RD25TC04NP1.0K-J/RD2 5VTP1.0K-J RKS-00C0001A	1	1/4W-1.0K-J-TP
11160	R 317	R-CARBON(TP)	RD25TC04NP6.8K-J/RD2 5VTP6.8K-J RKS-00C0001A	1	1/4W-6.8K-J-TP
11170	R 318	R-CARBON(TP)	RD25TC04NP680-J/RD25 VTP680-J RKS-00C0001A	1	1/4W-680-J-TP
11180	R 319	R-CARBON(TP)	RD25TC04NP4.7K-J/RD2 5VTP4.7K-J RKS-00C0001A	1	1/4W-4.7K-J-TP
11190	R 320	R-CARBON(TP)	RD25TC04NP4.7K-J/RD2 5VTP4.7K-J RKS-00C0001A	1	1/4W-4.7K-J-TP
11200	R 321	R-CARBON(TP)	RD25TC04NP39-J/RD25V TP39-J RKS-00C0001A	1	1/4W-39-J-TP

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		LCO Part No.		
12010	R 322	R-CARBON(TP)	RD25TC04NP10K-J/RD25 VTP10K-J RKS-00C0001A	1		1/4W-10K-J-TP		
12020	R 323	R-CARBON(TP)	RD25TC04NP2.2K-J/RD2 5VTP2.2K-J RKS-00C0001A	1		1/4W-2.2K-J-TP		
12030	R 324	R-CARBON(TP)	RD25TC04NP10K-J/RD25 VTP10K-J RKS-00C0001A	1		1/4W-10K-J-TP		
12040	R 325	R-CARBON(TP)	RD25TC04NP 15 K-J/RD2 5VTP 15 K-J RKS-00C0001A	1		1/4W- 15 K-J-TP		
12050	R 326	R-CARBON(TP)	RD25TC04NP4.7K-J/RD2 5VTP3.3K-J RKS-00C0001A	1		1/4W-3.3K-J-TP		
12060	R 327	R-CARBON(TP)	RD25TC04NP3.9K-J/RD2 5VTP3.9K-J RKS-00C0001A	1		1/4W-3.9K-J-TP		
12070	R 328	R-CARBON(TP)	RD25TC04NP1.0K-J/RD2 5VTP1.0K-J RKS-00C0001A	1		1/4W-1.0K-J-TP		
12080	R 329	R-CARBON(TP)	RD25TC04NP1.0K-J/RD2 5VTP1.0K-J RKS-00C0001A	1		1/4W-1.0K-J-TP		
12090	R 330	R-CARBON(TP)	RD25TC04NP680-J/RD25 VTP680-J RKS-00C0001A	1		1/4W-680-J-TP		
12100	VR 201	VR-SEMIFIXED	1/10W B-300OHM R129C522A1	1		129C522A1		
12110	VR 231	VR-SEMIFIXED	1/10W B-300OHM R129C522A1	1		129C522A1		
12120	VR 261	VR-SEMIFIXED	1/10W B-300OHM R129C522A1	1		129C522A1		
12130	VR 2A1	VR-SEMIFIXED	1/10W B-2KOHM R129C522A2	1		129C522A2		
12140	S 261	SW-SLIDE	SS-12SDP2 R439D529A1	1		439D529A1		
12150	S 231	SW-SLIDE	SS-12SDP2 R439D529A1	1		439D529A1		
12160	S 261	SW-SLIDE	SS-12SDP2 R439D529A1	1		439D529A1		
12170	S 301	SW-SLIDE	SS-12SDP2 R439D529A1	1		439D529A1		
12180	S 302	SW-SLIDE	SS-12SDP2 R439D529A1	1		439D529A1		
12190	S 303	SW-SLIDE	SS-12SDP2 R439D529A1	1		439D529A1		
12200	R 331	R-CARBON(TP)	RT25TC04NP2.2K-J/RD 5VTP 2.2K-J RKS-00C0001A	1		1/4W-2.2K-J-TP		

Item	Ref-Des	Part Name	Des .iption(Type/rating)	Q'ty	.ELCO Part No.
13010	R2A6	R-CARBON (TP)	RT25T C04NP 4.7K-J/RD25 VTP4.7K-J RK6-00C0001A	1	1/4W-4.7K-J-TP

Item	Ref-Des	Part Name	Description(Type/rating)	Q'ty		MELCO Part No.	
	IC401	IC	TDA1670	1		277P618-1	
	IC901	IC	STK-7406	1		277P611-1	
	Q501	TRANSISTOR	2SC3481	1		270P551-1	
	R527	R-CARBON	1/4W-100-J	1		1/4W-100-J	
	R528	R-CARBON	NOT-USED	1			
	C410	C-PLASTIC	50V-0.1M	1		50V-0.1M	
	D382	DIODE	RU-2	1		264P196-1	
	D508	DIODE	MA4056H	1			
	D509	DIODE	MZ303	1		264P193A5	
	VR291	VR	B-1K	1		129C505A1	
	—	CRT	AF14A9LB22				⚠

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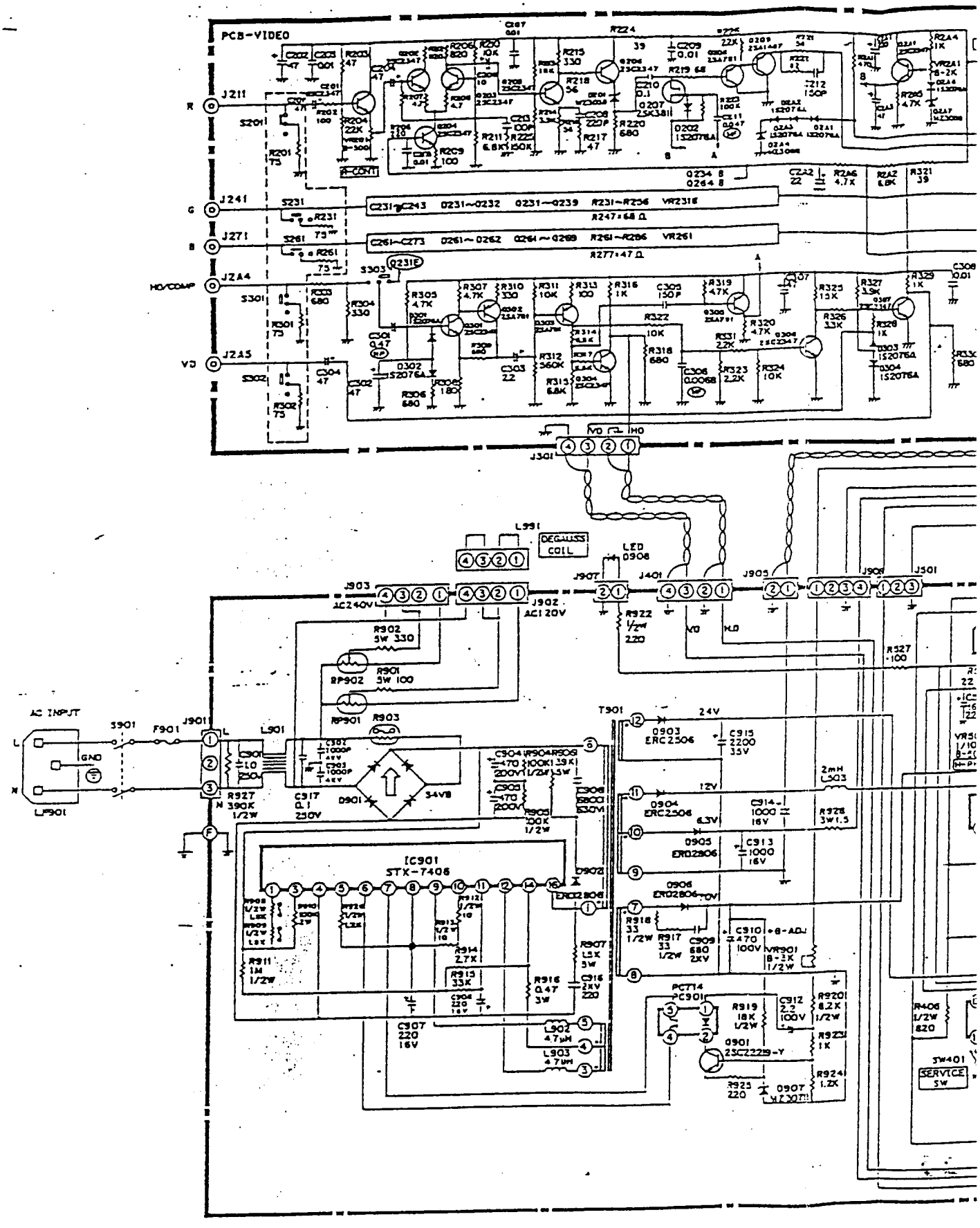
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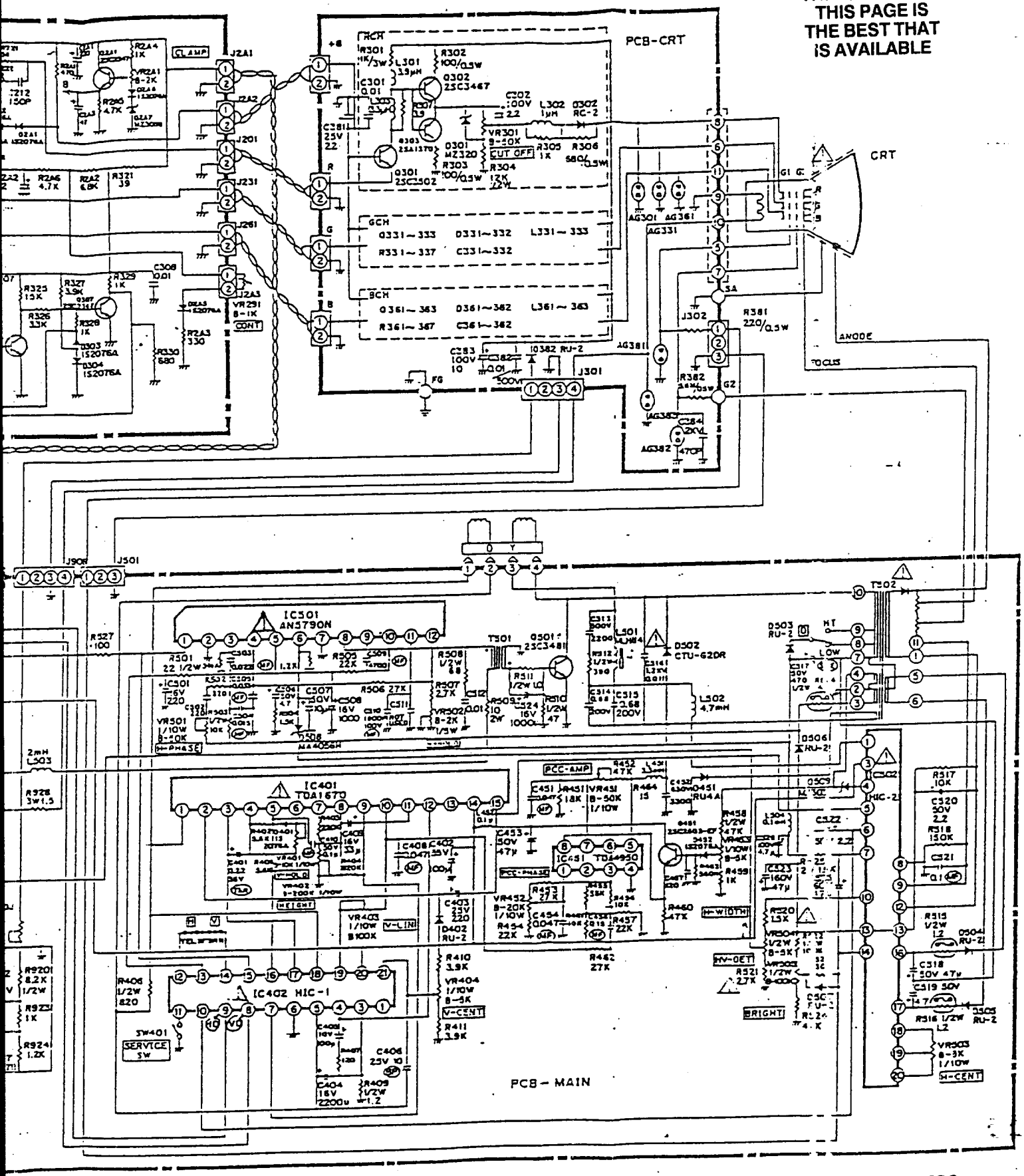

Fig. 5-1 SCHEMATIC DIAGRAM OF FHF3500

See Table 6-1, Table 6-2 and Table 6-3 for FHF2500/FHF1500 and HF3400/HF2400/HF1400

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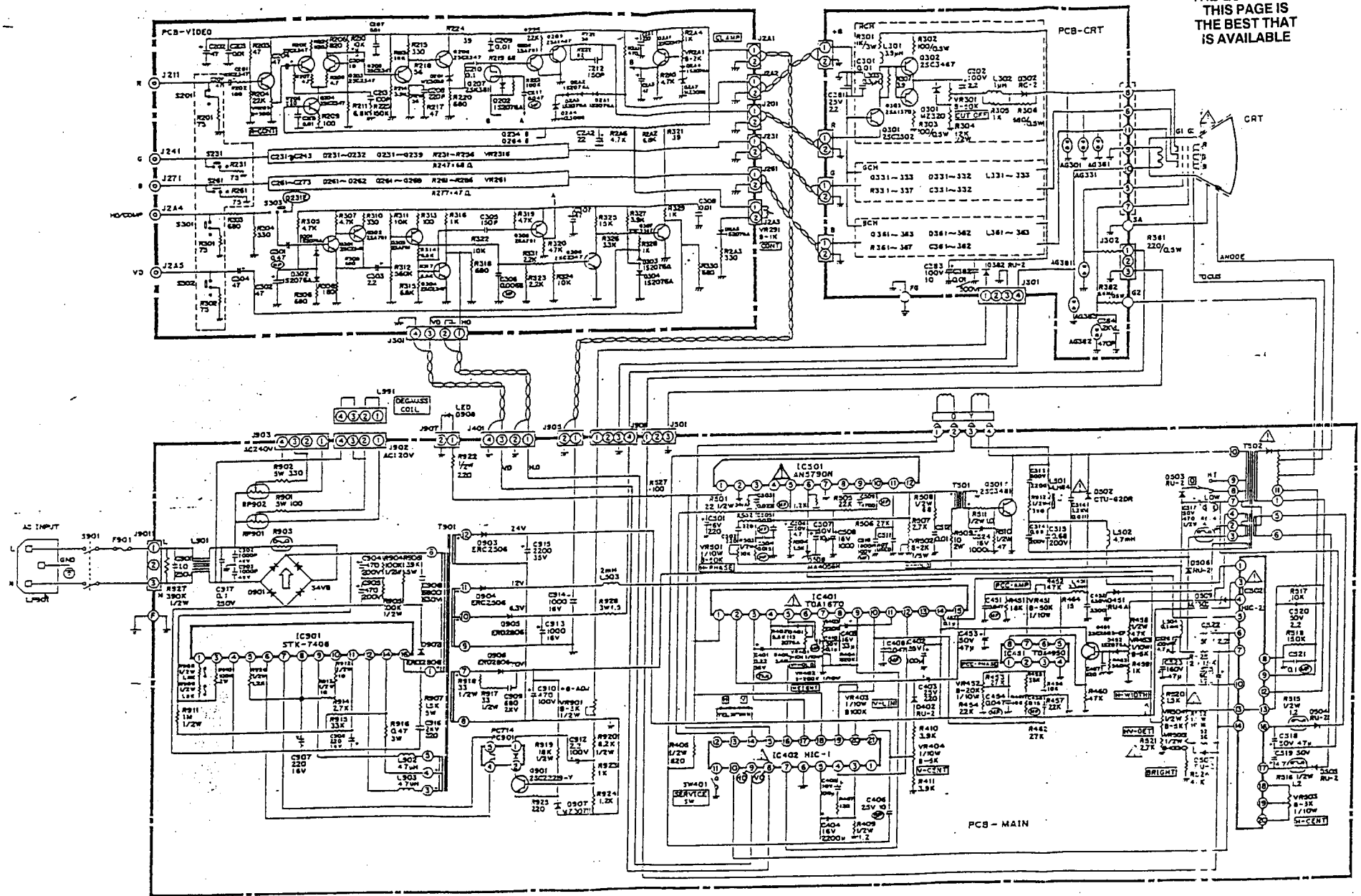

Fig. 5-1 SCHEMATIC DIAGRAM OF FHF3500

See Table 6-1, Table 6-2 and Table 6-3 for FHF2500/FHF1500 or HF3400/HF2400/HF1400